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ANNALS  
OF THE  
CARNEGIE MUSEUM

VOLUME VI.

1909-1910

W. J. HOLLAND, *Editor*

PUBLISHED BY THE AUTHORITY OF THE  
BOARD OF TRUSTEES OF THE CARNEGIE INSTITUTE  
AUGUST, 1909-AUGUST, 1910.



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## ERRATA ET CORRIGENDA.

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- Page 73, line 18, for "group" read "work."
- Page 76, line 20, for "tracks" read "tracts."
- Page 76, line 23, for "*La Chapada*" read "*do Chapada*."
- Page 97, under No. 22, *Lestes spumarius*, insert "(Pl. I., figs. 7, 19, 20)."
- Page 117, lines 19, 20, for "Porto Rican" read "Costa Rican."
- Page 236, line 12, for "**oscellata**" read "**ocellata**."
- Page 276, line 7, for "Queredo" read "Quevedo."
- Page 278, line 6, for "*Oyagrion*" read "*Oxyagrion*."
- Page 280, line 3, for "*Gymnothemis*" read "*Gynothemis*."
- Page 314, line 10, for "of" read "in."
- Page 323, line 1, for "*Aphantotriccus*" read "*Aphanotriccus*."
- Page 323, line 9, for "*saturata*" read "*saturatus*."
- Page 323, line 30, for "*cæruleigularis*" read "*cæruleigularis*."
- Page 324, line 12, for "*brunneinucha*" read "*brunneinuchus*."
- Page 324, line 33, for "*Amazilis*" read "*Amizilis*."
- Page 325, line 17, for "*albibarba*" read "*albibarbis*."
- Page 329, line 36, for "*castaneiceps*" read "*rufipectus*."
- Page 329, line 39, for "*hoffmani*" read "*hoffmanni*."
- Page 335, for "Barranca" read "Barránca."
- Page 338, for "Cervantes" read "Cervántes."
- Page 339, for "Coralillo" read "Coralíllo."
- Page 343, for "Guayabo" read "Guayábo."
- Page 347, for "Navarro" read "Navárrro."
- Page 355, line 34, for "*Aphantotriccus*" read "*Aphanotriccus*."
- Page 357, for "Zarcero" read "Zarcéro."
- Page 359, lines 29 and 30, for "*rufodorsalis*" read "*rufidorsalis*."
- Page 360, line 10, for "*æneus*" (second) read "*ænea*."
- Page 414, line 5, for "**podicips**" read "**podiceps**."
- Page 427, line 2, for "**Ajaia**" read "**Ajaia**."
- Page 438, line 33, for "PLOTIDÆ" read "ANHINGIDÆ."
- Page 439, line 13, for "*Pelicanus*" read "*Pelecanus*."

Page 440, line 9, for "*Pelicanus*" read "*Pelecanus*."

Page 441, line 1, for PELICANIDÆ read PELECANIDÆ.

Page 444, line 37, for "*furcatus*" read "*forficatus*."

Page 483, line 8, for "*aztec*" read "*astec*."

Page 484, line 8, for "**Pyrrhua**" read "**Pyrrhura**."

Page 484, line 17, for "*Pyrrhua*" read "*Pyrrhura*."

Page 511, line 10, for "*æneus*" read "*ænea*."

Page 512, line 7 and 11, for "*Clais*" read "*Klais*."

Page 518, line 33, for "**æneus**" read "**ænea**."

Page 578, line 11, for "*Jacameras*" read "*Jacamerops*."

Page 617, line 18, for "**læmostica**" read "**læmosticta**."

Page 628, line 3, for "*castaneiceps*" read "*rufipectus*."

Publications of the Carnegie Museum

Serial No. 59

# ANNALS

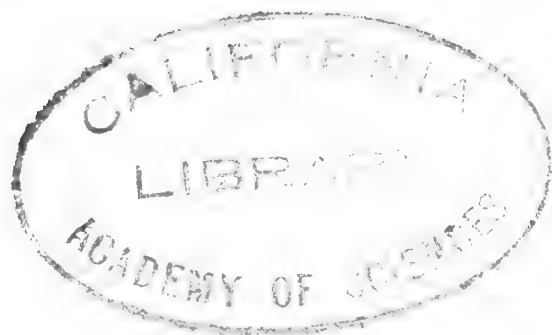
OF THE

# CARNEGIE MUSEUM

VOL. VI. No. I.

August, 1909

For sale by Messrs. Wm. Wesley & Sons, 28 Essex St. Strand, London, England;  
Messrs. R. Friedlaender u. Sohn, 11 Carlstrasse, Berlin, N. W. 6., Germany; and at  
the Carnegie Museum, Schenley Park, Pittsburgh, Pa., U. S. A.





PUBLICATIONS OF THE CARNEGIE MUSEUM

SERIAL No. 59

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PRESS OF  
THE NEW ERA PRINTING COMPANY  
LANCASTER, PA



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VOLUME VI. NO. I.

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## EDITORIAL NOTES.

THE fourth annual meeting of the American Association of Museums, held in Philadelphia from May the 11th to the 14th, was attended by a delegation from the Carnegie Museum consisting of the Director, Dr. A. E. Ortmann, Professor C. H. Eigenmann, Mr. and Mrs. O. E. Jennings, Mr. Earl Douglass, and Mr. J. A. Santens. Generous hospitality was accorded to the Association, and the arrangements which were made by Dr. W. P. Wilson and his associates were in the very highest degree agreeable. Many excellent papers were read and interesting discussions took place. The gathering from all parts of the United States of those who are engaged in the work of Museums, the opportunity to interchange views and to compare experiences is undoubtedly of the highest value, and it is to be sincerely hoped that the constantly growing membership of the Association will finally come to include all those who are in any way connected with or interested in the work of the museums of the western hemisphere. The volume of Proceedings for the last year, issued under the editorial supervision of Mr. P. M. Rea, is very creditable both from a literary and typographical standpoint.

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INTEREST in the work of the Entomological Society of Western Pennsylvania has been revived, and the Society has resumed its meetings at the Carnegie Museum. The last two sessions have been well attended by the working entomologists of the neighborhood and a number of very interesting and instructive displays of specimens show-

ing the life-habits of various species have been brought before the meetings. It is sincerely hoped that this Society, which is capable of doing much to promote the interests of this important branch of science, may gather into its membership many, who have not as yet identified themselves with it. Botany and entomology are the two branches of science which are most easily cultivated, and multitudes of those who have risen to eminence as naturalists began their early studies in one or the other. Western Pennsylvania is particularly interesting both from the standpoint of the botanist and the entomologist. Within this region is the meeting place of several faunas and floras, and much remains yet to be done. New species are constantly being discovered, even among our flowering plants, and hundreds of insects have been found within recent years, some of which have been named, and many of which remain to be made known to science. It is a great mistake to suppose that either the fauna or the flora of even so long a settled state, as that in which we live, is completely known.

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It is the wish of the authorities of the University of Bologna that the replica of the skeleton of the *Diplodocus*, which Mr. Carnegie has so kindly authorized to be presented to the King of Italy, and which His Majesty has decided shall be placed in the Hall of Vertebrate Paleontology of the new Aldrovandi Museum, which is in process of erection, shall be installed by the end of October; and it is also the wish of the Intendant of the Imperial Museum in Vienna that the like replica, which has been accepted by His Majesty, the Emperor of Austria, shall be installed in September. Strenuous efforts are therefore being made to comply with their wishes and to have the replicas completed, so that they may be shipped in time to permit of their installation as desired.

---

A REORGANIZATION of the Committee on the Museum, necessitated by the death of Mr. C. C. Mellor, and a change in the composition of the Board of Trustees, owing to the retirement from office of a number of those who represented the city through its councils, has been made. Mr. George H. Clapp has been appointed to the chairmanship of the Committee, and Mr. Howard Heinz and Dr. F. H. Colhouer have been added to the Committee, thus filling two vacancies which existed in it. Colonel S. H. Church still remains the Secretary of the Committee.

THE attendance at the Museum during the past two months has been remarkable and in excess of the attendance at any corresponding time in the history of the institution.

---

STRENUOUS efforts are being made to bring the large collections of alcoholic specimens which belong to the Museum into perfect order. The accumulated treasures of the past ten years prove to be very great. This is especially true in the Section of Ichthyology, and it is our hope within the next few years to have one of the best collections of fishes in the new world.

I. REPORTS ON THE EXPEDITION TO BRITISH GUIANA  
OF THE INDIANA UNIVERSITY AND THE CAR-  
NEGIE MUSEUM, 1908.<sup>1</sup>

REPORT NO. 1.

SOME NEW GENERA AND SPECIES OF FISHES FROM  
BRITISH GUIANA.

BY CARL H. EIGENMANN.

On August 22, 1908, I sailed by the Quebec S. S. Line from New York for Georgetown, British Guiana. I was accompanied by Mr. S. E. Shideler as volunteer assistant. We returned to New York the following December with a very large collection of fresh-water fishes. The general object of the expedition was to collect fishes from some of the rivers of South America flowing north from the Amazonian watershed. The particular object was to collect in some of the streams falling from the plateau of Guiana. The Potaro was selected. It arises in an unexplored region on the plateau of Central Guiana. At Aruataima, forty miles from the eastern edge of the plateau, there are cataracts. This is the most distant and most elevated point at which collections were made. At the Kaieteur Fall the Potaro River leaves the plateau by a drop of seven hundred and forty-one feet. This fall with the gorge below forms some of the most impressive scenery in the world. The gorge is about fifteen miles long. There are numerous cataracts below the Kaieteur, the last of which is the Tumatumari Cataract. The Potaro empties into the Essequibo River near Crab Falls.

Collections were made at the following localities: Essequibo River

<sup>1</sup> In order that the results of the explorations made by the author may, as soon as possible, become available by the scientific world, it has been decided to publish diagnoses of the new species as rapidly as they are worked up according to families. A full monograph upon the fishes of British Guiana, thoroughly illustrated, is in process of preparation. This paper will include a résumé of the labors of Schomburgk, Müller & Troschel, Günther, and others. The successful results of Professor Eigenmann's expedition will add a large number of species to those heretofore known to occur in that region. The present paper was written in the Zoölogical Laboratory of Indiana University and forms No. 101 of the Contributions from that laboratory.

W. J. HOLLAND.

at Warraputa Cataract; Essequibo River opposite the mouth of the Konawaruk River; Essequibo River at Crab Falls; Essequibo River at Rockstone; Tributary of Essequibo River, on Gluck Island, Rockstone; Bartica; Demarara River at Malali; Demarara River at Wismar; Demarara River at Christianburg; Christianburg Canal; Demarara River near Freiheit; Demarara River at Georgetown, Georgetown Market; Upper Potaro River at Aruataima Cataract; Tributaries of Upper Potaro River at Holmia; Upper Potaro River at a sand-bank two hours below Holmia; Upper Potaro River at Savannah Landing; Shrimp (Orimetuk) Creek; Lower Potaro at Tukeit; Lower Potaro at Waratuk Cataract; Lower Potaro at Amatuk Cataract; Lower Potaro at Kangaruma; Erukin Creek near confluence with the Lower Potaro; Creek near Potaro Landing; Lower Potaro at Tumatumari; Georgetown Trenches and Botanic Garden Trenches; Cane Grove Corner; Lama Stop-off and Maduni Stop-off about twenty-five miles east of Georgetown; Moro Passage; creeks and trenches about Koriabo Rubber Plantation; and Aruka River in the northwestern territory near the Venezuelan frontier.

The type specimen and a series of other specimens of each species are deposited in the Carnegie Museum at Pittsburgh. A full series is also retained in the collections of the Indiana University. In the following pages C. M. following a number refers to the collections of the Carnegie Museum; I. U. refers to those of the Indiana University.

### Order NEMATOGNATHI.

#### Family LORICARIIDÆ.

##### CORYMBOPHANES gen. nov.

Allied to *Rhinelepis*. No adipose fin, the fin replaced by a low median ridge extending from the tip of the dorsal to the caudal; no externally visible occipital crest.

##### **Corymbophanes andersoni** sp. nov.

Type unique, 86 mm. (No. 1001 Carnegie Museum Catalog of Fishes.) Aruataima Falls, Upper Potaro.

Head  $3\frac{2}{3}$  in the length, measured to end of opercle and end of the lateral plates; depth 6; D. 1,7; A. 1,4; V. 1,5; P. 1,6; lat. l. 24; eye  $5\frac{1}{2}$  in snout,  $7\frac{1}{2}$  in head to end of opercle, 3 in interorbital.

Oral disk everywhere thickly papillose, the papillæ largest along the margin of the upper lip and smallest at the angle of the mouth; barbel

about  $2\frac{1}{2}$  in the snout, its free portion less than orbit in length, its ventral surface papillose ; maxillary and dentary of about equal length, a little less than  $1\frac{1}{2}$  in the interorbital, each jaw with numerous minute teeth.

Ventral surface entirely naked ; margin of snout in front of base of barbels naked ; predorsal scales not regular ; posterior margin of skull concave on each side of the occipital crest, which is indicated by a point ; no ridges or grooves about the head ; lateral plates straight, not keeled ; a rather broad naked area along the dorsal.

Origin of dorsal in front of the vertical from the ventrals ; ventrals a little in advance of the middle ; highest dorsal ray reaching to about the middle of the last ray,  $4\frac{1}{2}$  in the length ; caudal emarginate, the lower lobe slightly longer ; origin of anal under vertical from middle of last dorsal ray ; ventrals reaching middle of anal, pectorals past origin of ventrals.

Dark, with faint lighter spots ; fin rays dark, the membranes hyaline.

I take pleasure in naming this species, obtained at my farthest point, for C. Wilgress Anderson, Government Surveyor, an explorer in the Potaro and Roraima regions.

#### LITHOGENES gen. nov.

Characters of *Plecostomus*, the dermal armature reduced to a few ossicles on the back behind the adipose and along a median line from above the origin of the anal to the caudal.

#### **Lithogenes villosus** sp. nov.

Type unique, 44 mm. (No. 1002 Carnegie Museum Catalog of Fishes.) Aruataima Falls, Upper Potaro.

Head 3.5 ; depth 7 ; D. 8 ; V. 1,4, P. 1,8 ; eye 6 in snout, 8 in head, 2.75 in interorbital ; width of head equals snout and orbit ; width behind the pectorals about  $\frac{1}{5}$  greater than the height.

Oral disk large, margined by a series of incisions ; lips smooth with the faintest rugosities ; a bunch of about twenty-five blunt villi in immediate association with the dentary ; barbel equal to prenasal part of the snout measuring from the base of the barbel, free part of barbel equals eye ; a narrow free membrane from the barbel margining the lip outside of the incised inner margin from the barbel to a point behind the angle of the mouth.

Dentary with two teeth, each with two widely diverging cusps ; pre-

maxillary with eight teeth, each with two nearly parallel cusps, of which the inner one is much the longer.

Origin of the dorsal above the middle of the ventrals, the first ray, not much more than half as long as the second, not spinous, the highest ray a little less than the snout; spine of the adipose  $\frac{2}{3}$  of the length of the snout, covered with a few spines, tip of spine nearly reaching end of base of adipose part of the fin; caudal rather deeply emarginate, the lower lobe the longer; origin of anal half way between tip of dorsal and origin of adipose; outer ventral ray very thick and fleshy, covered with spines, its base much wider than that of the rest of the fin, reaching a little more than half way to anal; length equal to the snout; pectorals reaching to near tip of ventrals, its spine not much larger than the rest of the rays, with a few prickles.

Naked except for a double series of plates along the ventral surface of the caudal peduncle from near the tip of the anal and curved up on either side of the caudal to the base of the middle rays; about fourteen platelets along the middle of the sides from above the origin of the anal to the base of the middle caudal rays, widest above the tip of the anal where they are a little wider than the eye; a double series of plates on the back, beginning on either side of the spine of the adipose to the caudal; outer caudal rays with prickles, a few spinelets on the caudal.

A dark band from the eye forward, increasing in width to above the base of the maxillary; back and upper part of sides marbled; caudal dark, the outer rays lighter.

Genus LORICARIA Linnæus.

**Loricaria microdon** sp. nov.

? *Loricaria acuta* (non Valenciennes) Müller & Troschel, in Schomburgk. "Reisen in Brit. Guiana"; III, 631. (Sand bars of the Rupununi.)

This species is closely allied to, if not identical with, *acuta*. Regan gives the lower lip of *acuta* as entire.

Type, 90 mm. (No. 1507 Carnegie Museum Catalog of Fishes.) Rupununi.

Cotypes, two, 76 and 112 mm. to tip of middle caudal ray. (I. U.) Rupununi.

Head  $4-4\frac{3}{5}$ ; width of head  $1\frac{2}{3}-1\frac{1}{2}$  in its length; eye 6, equal to interorbital; snout  $2+$  in the head; width at first anal ray  $5\frac{1}{3}-$

$6\frac{1}{3}$  in its distance from the caudal ; 17 or 18 + 14 scutes, the keels remaining separate throughout ; upper lip not developed in the middle, entire on the sides in the largest specimen, fringed in the type ; lower lip notched in the middle, deeply concave on each side in the type ; the barbel extends considerably beyond the widest part of the lip, its free portion equal to the eye. Margin of the lower lip notched. Lips smooth. Lower lip in the largest specimen damaged, apparently reaching to the gill-opening, with a marginal fringe of tentacles.

Teeth excessively minute, twenty or more on each side of the lower jaw ; about eight conical teeth on each side of the upper jaw.

Plates in front of the fourth dorsal ray keeled, a pair of keels on the occipital ; eyes with large angular notches which encroach on the interorbital in the largest specimen. Anal plate pointed in front, bordered by two or three plates, the three together united into a larger plate in the largest specimen ; ventral buckler formed of six plates ; apparently only four in the largest, a single series of plates between the lateral series, two or more series further forward. Ventral armature reaching to the gill-opening, lower surface of head naked.

Pectorals truncate, the spine not produced, scarcely reaching ventral ; ventral rounded or the rays graduate, reaching to, or a little beyond, the origin of the anal. Dorsal spine equal to distance from snout to upper angle of gill-opening.

Five or six cross-bands, the first extending down and forward from the third and fourth dorsal rays, the second being a large spot on the sides a little in front of the tip of the dorsal ; dorsal spotted, most conspicuously so at its tip ; pectorals dusky, or faintly spotted ; ventrals a little lighter ; anal hyaline ; caudal faintly spotted ; the tip of the lower lobe black. Upper caudal ray scarcely produced.

**Loricaria griseus** sp. nov.

Type, 131 mm. over all, 118 to tip of middle caudal rays. (No. 1504 Carnegie Museum Catalog of Fishes.) Conawaruk.

Cotypes, 11 specimens, 36–108 mm. to base of middle caudal ray. Conawaruk. (C. M. Cat. No. 1505, *a-c* ; I. U. Cat. No. 11926.)

Cotypes, 22 specimens, 49–119 mm. to base of middle caudal rays. Bartica Sand Bank. (C. M. Cat. No. 1506, *a-e* ; I. U. Cat. No. 11927.)

Allied to *punctatus* and *maculatus*.



Head 4.5-5; width of head 1.4-1.5 in its length; eye 5; interorbital 6.5-7; snout 2 in the head; width at first anal ray 5-5.33 in its distance from the caudal; 18 or 19 + 11 scutes, the lateral keels remaining separate throughout.

Upper lip well developed, thickly papillose in the types, and always margined with well-developed tentacles, which are shortest or absent at the center. Lower lip in the type very broad, extending to the middle of the opercle, everywhere minutely warty with a few larger warts on its anterior half, emarginate, otherwise with the edge smooth; lips ordinarily much narrower, not much wider than the part with larger warts, deeply emarginate, and the edge with minute tentacles; free portion of the barbel scarcely half the length of the eye.

Teeth minute, about 6-8 on each side of the upper jaw and twelve on each side of the lower, those of the upper jaw much smaller than the largest of the lower jaw.

Head without ridges, an obscure groove on the occipital, sometimes continued in the first or first two nuchal plates; orbital notch broad and shallow, rounded, not encroaching on the interorbital; lower surface of the head naked; plates of the body without keels or ridges; anal plate normally bordered by three plates, but sometimes by four or five; two to four series of plates between the lateral plates of the belly; anterior border of the ventral armature on a line with the gill-openings; truncate or emarginate through the development of minute plates on the side in front.

Pectoral truncate when half expanded, emarginate when depressed, the spine not prolonged, reaching second fourth of the ventrals. Ventrals usually rounded, or truncate, scarcely reaching the anal; in a few of the Bartica specimens the inner rays are prolonged, reaching to near the fourth anal ray; upper caudal ray in a well-preserved specimen 2.5 times the length of the middle ray.

Sand-colored, back everywhere spotted; very obscure cross-bars; dorsal, pectoral, and more obscurely the ventral colored like the back; upper part of caudal with cross-bars, tip of lower caudal lobe blackish; anal hyaline.

***Loricaria stewarti* sp. nov.**

Type, 81 mm. over all, 64 mm. to tip of middle caudal ray. (No. 1508 Carnegie Museum Catalog of Fishes.) Chipoo Creek, a tributary of the Ireng.

Cotypes, 11 specimens, 52–68 mm. to tip of middle caudal rays. Chipoo Creek. (C. M. Cat. No. 1509, *a-c*; I. U.)

Allied to *magdalenæ*, *konopickyi* and *brunnea*, differing from the latter in having the head strigilate.

Head 5; width of head  $1\frac{1}{2}$  in its length; eye 6, interorbital  $4\frac{1}{2}$ , snout 2.2 in the head; width at first anal ray 5.33–5.66 in its distance from the caudal; 17 + 13 to 14 + 15 scutes, the lateral keels nearly merged behind.

Upper lip with a marginal fringe of tentacles; lower lip not extending to the gill-opening, papillose except near the margin, with a marginal series of tentacles.

About six teeth on each side of the upper jaw and eight on each side of the lower.

Head and body strigilate, lateral keels weak, other scutes, except nuchal scutes, not carinate; occipital with a pair of slightly diverging keels, the two nuchal plates following it each with a pair of keels.

Orbital notch narrow and deep, eye nearly circular. Lower surface of the head naked except for a narrow entering triangle in front of the gill-opening.

Anal plate margined by three large plates, the ventral buckler composed of eleven plates; posteriorly three, anteriorly five, series of plates between the lateral series of the belly. Ventral armature fully developed even in the smallest to between the anterior angle of the gill-openings.

Dorsal spine about equal to the head. Pectorals truncate, reaching ventrals. Ventrals rounded, or the outer ray slightly produced, reaching the anal; upper caudal ray forming considerably more than a third of the total length.

Dark, with the usual cross-bars; pores black, but not conspicuous. Dorsal rays spotted, a large spot near the tip of the three first rays. Pectorals, ventrals, and anal barred, the bars most evident on the first rays. Base and margin of caudal black, the outer rays barred.

Named for Mr. Douglas Stewart, Curator of Mineralogy and Assistant to the Director of the Carnegie Museum.

#### ***Loricaria submarginatus* sp. nov.**

Type unique. (No. 1510 Carnegie Museum Catalog of Fishes.) 142 mm. over all, 92 mm. to tip of middle caudal rays. Creek below Potaro Landing.

Closely allied to *brunnea*.

Head very little less than five in the length; width of head 1.5 in its length; eye 5.5; interorbital 4; snout 2 in the head; width of first anal ray 5 in its distance from the caudal; 12 + 15 scutes, the lateral ridges almost completely united on the last seven scutes.

Lips well developed, with a marginal series of fringes, which is interrupted in the middle in front, and with rather long warts. Lips not nearly reaching gill-opening. Seven or eight teeth in each side of each jaw. Free portion of the barbel about equal to the eye.

Head without ridges, plates in front of the dorsal but faintly keeled. Orbital notch shallow, narrowly rounded.

Anal plate bordered by three plates in front; the ventral buckler formed of seven plates; about three series of plates between the lateral plates, these with the lateral plates forming in the posterior part regular transverse scutes, the plates becoming more numerous and less regular in front. Armature of belly truncate in front, not extending quite to the anterior angle of the gill-opening.

Pectorals, slightly emarginate, the inner angle rounded, extending to the second fourth of the ventrals; ventral rays graduate, the outer ray scarcely prolonged, reaching to the base of the last anal ray.

Pores of the head and on the body to below the dorsal jet-black; obscure cross-bands; that below the base of the dorsal and that below its tip most prominent. No ocellus in front of dorsal. Dorsal spotted, the submarginal spots most prominent. Pectoral, ventral, and anal each with a broad submarginal dark band, base of caudal and the tips exclusively of the upper ray black. Upper caudal ray much prolonged forming 51 mm. of the total length of 142 mm.

### *PYGIDIIDÆ.*

Genus PYGIDIUM Meyen.

#### **Pygidium guianensis** sp. nov.

Type, 77 mm. (No. 1003 Carnegie Museum Catalog of Fishes.)  
Aruataima Falls, Upper Potaro.

Cotype, 34 mm. Waratuk, Lower Potaro (I. U. Cat. No. 11710).

Cotype, 41 mm. Amatuk, Lower Potaro.

Head 6; depth equals head in length; D. 9; A. 7; eye 4 in snout, 9.5 in head.

Head nearly as broad as long; maxillary barbel reaching to tip of

opercle ; teeth in bands of about four irregular series ; origin of anal under middle of dorsal ; dorsal fulcra extending forward to near the dorsal ; caudal rounded ; first pectoral ray prolonged in a filament nearly as long as the rest of the ray ; everywhere except on belly and lower surface of head with round dark spots ; caudal dusky, the margin light.

In the cotypes the head is comparatively longer, 5 in the length ; the color is light below, uniformly yellowish brown above ; pectoral filament short.

### Order PLECTOSPONDYLI.

#### Family CHARACIDÆ.

#### Subfamily GASTEROPELICINÆ.

The genera of Gasteropelicinae are very similar. They differ from each other in dentition and the development of the adipose fin. They may be distinguished among themselves by the characters indicated in the following key :

- a.* No adipose fin ; maxillary with a single large tooth ; premaxillary teeth in a single series. *Carnegiella* Eigenmann.
- aa.* Adipose dorsal present.
  - b.* Maxillary with large conical or hooked teeth.
    - c.* Premaxillary teeth in two series. *Thoracocharax* Fowler.
    - cc.* Premaxillary teeth in a single series. *Gasteropelecus* Linnæus.
  - bb.* Maxillary without teeth ; premaxillary teeth in a single or double series. *Pterodiscus*<sup>2</sup> Eigenmann.

<sup>2</sup> *Pterodiscus* gen. nov.

Type : *Pterodiscus levis* sp. nov.

Characters of *Gasteropelecus*, but the maxillary without teeth, and the premaxillary teeth in one or two series.

#### *Pterodiscus levis* sp. nov.

Type, 47 mm., No. 34454 U. S. Nat. Mus., Para. J. C. Brevoort.

Cotypes, 37 and 46 mm., No. 34454 U. S. Nat. Mus., and 32 mm. (to base of caudal), No. 11479 I. U. Mus., Para. J. C. Brevoort.

Head 4-4.25 ; depth 1.8 ; D. 10 or 11 ; A. 31, 31, 35 and 32 respectively ; lat. 1.18 ; 29-32 scales in a median lateral series ; eye 3 in the head, 1.5 in the interorbital.

No teeth on the maxillary. Premaxillary teeth in a single series in two specimens, one tooth moved forward forming an additional series in the two other specimens.

A dark lateral streak ; base of anal and margin of disk dark.

I am not able to detect material differences between the specimens of this species, all old and poor, and typical *Gasteropelecus sternicla* except in the absence of teeth on the maxillary.

**Carnegiella**<sup>3</sup> gen. nov.

Type: *Gasteropelecus strigatus* Günther.<sup>4</sup>

*Carnegiella* is distinguished by the following general characters: No adipose fin. Premaxillary with about nine tricuspid teeth in a single series; maxillary with a single, large, conical tooth at its upper anterior angle; lateral line broken after the sixth pore.

**Carnegiella strigata** (Günther).

Head about 4; depth about 2; D. 10; A. 27-29; scales 30, 12-15 pores in the lateral line, the line broken after the sixth scale; eye 3 in the distance from tip of chin to end of opercle.

Of this species I secured the following specimens:

Sixty-eight specimens, 20-42 mm. Maduni Creek. (C. M. No. 1296, *a-o*; I. U. M. No. 11784.)

Forty-three specimens, 30-37 mm. Woodland brook on Gluck Island. (C. M. No. 1297, *a-o*; I. U. M. No. 11785.)

Fourteen specimens, 30-39 mm. Malali. (C. M. No. 1298, *a-e*; I. U. M. No. 11786.)

Seven specimens, 33-36 mm. Tumatumari. (C. M. No. 1299, *a-c*; I. U. M. No. 11787.)

Sixteen specimens, 35-44 mm. Creek below Potaro Landing. (C. M. No. 1300, *a-e*; I. U. M. No. 11788.)

One specimen, 30 mm. Rupununi Pan. (C. M. No. 1301.)

This species is found in small, woodland streams; thus contrasted with the species of *Gasteropelecus*, which are pelagic in their habit.

## Subfamily TETRAGONOPTERINÆ.

## Genus MOENKHAUSIA Eigenmann.

**Moenkhausia browni** sp. nov.

(Native name "Conia.")

Type, 66 mm. (No. 1004 Carnegie Museum Catalog of Fishes.) Aruataima Falls, Potaro River.

<sup>3</sup> At the suggestion of my friend, Doctor W. J. Holland, I take great pleasure in naming this genus for Miss Margaret Carnegie.

<sup>4</sup> The species *strigatus* is based on two badly preserved specimens, one and a half inches long, from the "Old Collection," without locality. The characters given are: "D. 9; A. 27; lat. l. 25. Thorax with four blackish bands radiating from the middle of its convex edge; a blackish band along the base of the anal fin."

The genus *Carnegiella* is based on specimens collected by me in British Guiana. They are most probably the *Gasteropelecus strigatus* of Günther, with which the *G. fasciatus* of Garman is synonymous.

Cotypes, 25 specimens, 46–82 mm. Holmia, Potaro River. (C. M. Cat. No. 1005, *a-e*; I. U. Cat. No. 11711.)

Cotypes, 12 specimens, 28–68 mm. Two hours below Holmia. (C. M. Cat. No. 1006, *a-c*; I. U. Cat. No. 11712.)

Cotypes, 69 specimens, 23–80 mm. Savannah Landing above Kaieteur. (C. M. Cat. No. 1007, *a-j*; I. U. Cat. No. 11713.)

Cotype, 1 specimen, 31 mm. Creek below Savannah Landing above Kaieteur. (C. M. Cat. No. 1008.)

Cotypes, 9 specimens, 30–62 mm. Tukeit below Kaieteur. (C. M. Cat. No. 1009, *a-b*; I. U. Cat. No. 11714.)

Cotypes, 2 specimens, 48–50 mm. Amatuk, Lower Potaro. (C. M. Cat. No. 1010; I. U. Cat. No. 11715.)

Cotype, 1 specimen, 65 mm. Tumatumari, Lower Potaro. (C. M. Cat. No. 1011.)

Very similar to *oligolepis*, but without trace of caudal spot and with the anal falcate.

Head 3.75–4; depth 2.3–2.6; D. 11; A. 23 or 24; scales 5–30 to 34–3; eye 2.4–2.5; interorbital 2.8–3.

Compressed, elevate; the dorsal profile high, angulated at the origin of the dorsal; profile depressed over the eye; ventral profile regularly arched from the snout to the end of the anal. Predorsal area narrowly rounded, with a median series of eight to ten scales; pre-ventral area bluntly keeled, with a median series of scales; postventral area narrowly rounded, with a series of saddle-shaped median scales.

Occipital process 4 in the distance from its base to the dorsal, bordered by three scales on the side; head narrow, interorbital convex, smooth; fontanels of equal width, the posterior considerably longer, continued as a groove to the tip of the process. Second suborbital striate, leaving a considerable naked area (entirely covering the cheeks in *oligolepis*). Maxillary 2.6 in the head. Usually five teeth in the front row of the premaxillary, the third tooth withdrawn from the line of the rest; five graduated teeth in the inner series; the mandible with four large graduate teeth in the front and small ones on the sides. Three small teeth in the maxillary.

Scales regularly and deeply imbricate, without interpolated rows, each scale with numerous radiating striæ; lateral line sagging to below the middle of the dorsal; anal sheath of a single series of scales along the first twelve rays; caudal lobes scaled for half their length.

Origin of dorsal in advance of the middle of the body, its longest .



ray  $2\frac{1}{2}$  as long as the penultimate,  $3\frac{1}{3}$  in the length; caudal lobes equal, a little longer than the longest dorsal ray; anal emarginate, its longest ray when depressed reaching the base of the last but fourth anal ray; ventrals reaching anal, pectorals about one scale beyond origin of ventrals.

No caudal spot, a large horizontally oval humeral spot continued below to the origin of the pectoral; a dark band from origin of dorsal obliquely downward and forward to the lateral line; a dark median lateral line; white below, dark along back; each scale of the side with a conspicuous dark crescent along its middle.

In life all fins but the adipose strongly tinged with red; middle of adipose yellow.

This species, abundant in the Potaro River above and below the Kaieteur, is dedicated to the memory of C. Barrington Brown, the discoverer of this most beautiful fall.

***Moenkhausia shideleri* sp. nov.**

Type, 65 mm. (No. 1012 Carnegie Museum Catalog of Fishes.)  
Bartica.

Cotype, 73 mm. Bartica. (I. U. Cat. No. 11716.)

Cotype, 63 mm. Tumatumari.

This species has the largest eye of any in the genus.

Head 3.7-3.8; depth 2.5-2.7; D. 10; A. 26; scales 5-34-3 or 4; eye 2.1; interorbital 2.4 or 2.5.

Elongate, subrhomboidal, the ventral surface in front of the anal distinctly arched; a very slight depression over the eye; preventral area rounded, a series of median scales; post-ventral region narrowly rounded, with a median series of large scales, bordered by slightly asymmetrical scales. Predorsal area keeled to near the occipital crest. A median series of scales between the dorsal and occipital crest, the length of which is about one-fifth of the distance from its base to the dorsal.

Interorbital slightly convex; second suborbital leaving a narrow naked border on the cheek. Maxillary 3 in the head; four or five teeth in the front row of the premaxillary, the third somewhat removed from the rest; five graduated teeth on the inner row; two small teeth on the maxillary; mandible with four large teeth and numerous small ones on the side.

Gill rakers about  $9 + 12$ .

Scales regularly and deeply imbricate, each with several divergent striæ. Anal sheath of a few scales in a single row near front of anal; lateral line but little decurved; caudal scaled for about one-fourth of its length.

Origin of dorsal in front of middle of body, but little more remote from snout than dorsal; highest dorsal ray about  $2\frac{2}{3}$  in the length; caudal deeply forked, the lobes longer than the dorsal; anal deeply emarginate; ventrals not reaching anal, pectorals just to ventrals.

No humeral spot; caudal with a small diffuse dark spot at the base of the middle rays. Scales of sides margined with dark, the marginal spots tending to form dark lines along the sides; pigment more profuse toward the back; a series of dark spots on the median series of scales of the back.

Named for Mr. S. E. Shideler, who as volunteer assistant collected the species and gave most effective help during the entire expedition.

Genus *ASTYANAX* Baird & Girard.

***Astyanax guianensis*** sp. nov.

Type, 54 mm. (No. 1013 Carnegie Museum Catalog of Fishes.) Warraputa.

Cotypes, 176 specimens, Rockstone, Essequibo River. (C. M. Cat. No. 1014, *a-z*; I. U. Cat. No. 11717.)

Cotypes, 2 specimens, 45-52 mm., Crab Falls, Essequibo River. (C. M. Cat. No. 1015; I. U. Cat. No. 11718.)

Cotypes, 2 specimens, 50-55 mm., Warraputa, Essequibo River. (C. M. Cat. No. 1016; I. U. Cat. No. 11719.)

Cotypes, 34 specimens, 43-55 mm., Tumatumari, Potaro Kiver. (C. M. Cat. No. 1517, *a-j*; I. U. Cat. No. 11720.)

Allied to *multidens*, but without caudal spot.

Head 4; depth 2.6-3; D. 10 or 11; A. 25-27; scales 5-34 or 35 (rarely 36)-4; eye 2.33; interorbital 3.

Compressed, subrhomboidal, ventral profile regularly arched; dorsal profile with an angle at the origin of the dorsal, slightly depressed over the eye; preventral area rounded, tending to flattish, with a median series of scales sometimes irregular in the middle; post-ventral area narrowly rounded; predorsal area rounded, with a median series of nine scales.

Occipital process about 4 times in the distance from its base to the dorsal, bordered by three scales on the sides; interorbital flat, with

marginal grooves; frontal fontanel shorter, triangular; second sub-orbital covering the entire cheek with the exception of a triangular area below the junction between the first and second suborbital; maxillary much shorter than the eye, 3 in the head; four or five teeth in the first row of the premaxillary, if five, the third very slightly out of line with the others; five graduated teeth in the second row, their denticles arranged in a slight crescent; four to seven teeth in the maxillary; mandible with four large teeth, abruptly smaller ones on the sides.

Scales everywhere regularly imbricate, no omitted or interpolated scales; each scale of the side with from two to eight diverging striæ; anal sheath of very few scales in a single series along the base of the anterior rays; a few scales on the base of the caudal lobes.

Ventrals slightly nearer snout than the dorsal; the origin of the dorsal in advance of the middle, its highest ray 3.25 in the length; anal deeply emarginate, the second and eleventh reaching the base of the eighteenth; ventrals reaching anal, pectorals slightly beyond ventrals.

Opercle dusky; a dark vertical band crossing the third to the sixth scales behind the head; a dusky streak below origin of dorsal; sides behind this profusely dotted; margins of scales of the sides of the abdomen with a few color-cells; very few cells on the cheeks; base and tip of dorsal hyaline, the middle with chromatophores; adipose dotted; caudal nearly uniformly dotted, a small area at base of each lobe free from chromatophores; anal lobe and a streak through its middle free from pigment; ventrals and pectorals practically free from pigment.

***Astyanax essequibensis* sp. nov.**

Type, 53 mm. (No. 1018 Carnegie Museum Catalog of Fishes.) Tumatumari, Potaro River.

Cotypes, 96 specimens, 40–68 mm. Tumatumari, Potaro River. (C. M. Cat. No. 1019, *a–z*; I. U. Cat. No. 11721.)

Cotype, 1 specimen, 44 mm. Bartica, Essequibo River. (C. M. Cat. No. 1020.)

Cotypes, 3 specimens, 41–48 mm. Rockstone, Essequibo River. (C. M. Cat. No. 1021, *a*; I. U. Cat. No. 11722.)

Cotypes, 75 specimens, 39–57 mm. Crab Falls, Essequibo River. (C. M. Cat. No. 1022, *a–z*; I. U. Cat. No. 11723.)

Allied to *paucidens*, but having a well-developed humeral spot.

Head about 4; depth 3.33; D. 11; A. 20-22; scales 5-33 to 35-4; eye 2.3; interorbital 3.

Elongate, ventral profile regularly arched; dorsal profile with an angle at the origin of the dorsal, profile not depressed over the eye; preventral area flat, postventral narrowly rounded, predorsal area rounded, with a median series of eight or nine scales.

Occipital process about  $\frac{1}{5}$  of the length from its base to the dorsal, bordered by three scales; interorbital nearly flat, with marginal grooves; fontanel narrow, longer than the parietal; second suborbital leaving a triangular naked area below its junction with the first; maxillary 3 in the head; premaxillary with two to four teeth in the front series, which is parallel with the second series; five teeth in the second row, their denticles arranged in a distinct crescent; maxillary with three teeth; mandible with four graduated teeth and abruptly smaller ones on the sides.

Scales as in *guianensis*, but fewer scales on the base of the caudal lobe.

Dorsal and ventrals equidistant from tip of snout; highest dorsal ray about 3.75 in the length; origin of dorsal about equidistant from tip of snout and tip of adipose; anal emarginate; ventrals not quite reaching anal; pectorals to ventrals.

Highly iridescent, a few chromatophores on cheek and opercles; an oblique dark band crosses the second, third, and fourth scales of the lateral line, another one parallel to it in front of the dorsal shades into the thickly punctate sides; a punctate band extends from the base of the first dorsal ray to the tip of the seventh and eighth; tip of adipose black; a minute spot at the base of the middle caudal rays, tip of the rays dusky, all of the membranes punctate, a punctate band from the middle of the first anal rays along the tips of the rest of the rays, other parts of the fin hyaline; pectorals and ventrals slightly punctate.

***Astyanax mutator* sp. nov.**

(Native name, *Punkay*.)

Type 53 mm. (No. 1023 Carnegie Museum Catalog of Fishes.) Savannah Landing, Upper Potaro.

Cotypes, 120 specimens, 23-58 mm. Savannah Landing, Upper Potaro. (C. M. Cat. 1024, *a-z*; I. U. Cat. 11724.)

Head 4; depth 2.75-3; D. 11; A. 21-24, most frequently 22; scales 6-33 to 35-4 $\frac{1}{2}$ ; eye 2.75-3; interorbital equals eye.

Compressed, dorsal and ventral profiles equally curved; snout narrow, pointed, profile not depressed over the eye; preventral area rounded, without a distinct median series of scales; postventral area narrowly rounded; predorsal area keeled, with a median series of nine or ten scales.

Occipital process very narrow, about  $\frac{1}{5}$  as long as the distance of its base from the dorsal, bordered on each side by three scales; interorbital convex, frontal fontanel much shorter than the parietal; second suborbital narrow, leaving a naked area, which is more than half as wide as the bone itself; maxillary equals snout in length, its front margin very convex; width of lower jaw about half the orbit; premaxillary with two to four teeth in the front series, five five-pointed teeth in the second series; maxillary with three teeth, of which one is minute; dentary with five or six five-pointed teeth, graduate; abruptly a series of minute conical teeth on the sides.

Gill rakers 11 + 18.

Scales regularly imbricate, no interpolated or omitted series; anal sheath of a single series of scales along anterior part of anal; lateral line little decurved, sometimes broken or interrupted on the tail; each scale with several radiating striæ.

Origin of dorsal midway between tip of snout and base of middle caudal rays; highest dorsal ray nearly 4 in the length; origin of anal and ninth to eleventh dorsal ray equidistant from snout; anal very slightly emarginate; ventrals considerably in front of the vertical from the first dorsal ray, just reaching anal; pectorals just to ventrals or a trifle shorter.

Dusky; a definitely circumscribed oval caudal spot, not continued forward or backwards on the middle caudal rays; a well-defined bar crossing the second and third scales of the lateral line; sides of head and body everywhere profusely dotted; dorsal, caudal, and anal dotted; base of caudal with the outlines of the rays and their cross-breaks outlined in black, making this part of the fin darker.

***Astyanax mucronatus* sp. nov.**

Type, 53 mm. (No. 1025 Carnegie Museum Catalog of Fishes.) Tumatumari, above fall.

Cotypes, 3 specimens, 51–54 mm. Tumatumari, above fall. (C. M. Cat. No. 1026; I. U. Cat. No. 11725.)

Cotypes, 14 specimens, 46-73 mm. Sandbank in Potaro at Tukeit. (C. M. Cat. No. 1027, *a-e*; I. U. Cat. No. 11726.)

Head 3-6; depth 2.3-2.6; D. 11; A. 25-26, rarely 27; scales 6-34 or 35-5 (rarely 4). Eye 2.7; 2 in the head without the opercle; interorbital 3-3.5 in the head.

Compressed, subrhomboidal, with heavy head and slender caudal peduncle. Dorsal profile slightly depressed over the eye, rising with a gentle curve to the origin of the dorsal, abruptly descending to the end of the dorsal and then with a more gentle slope to the caudal peduncle. Ventral profile more regularly arched. Preventral region broadly rounded, postventral area more narrowly rounded; predorsal area keeled, with a median series of eight scales.

Occipital crest exceptionally narrow at the base; about one-fourth of the distance from its base to the dorsal bordered by three scales on the sides; skull narrow, slightly convex, smooth. Fontanels very narrow and long, the frontal fontanel as long as the parietal. Second suborbital leaving but a very narrow naked area. Maxillary but little longer than snout, 3.3 in the head. Premaxillary with two or three teeth in the front series, five teeth in the second series, their denticles in a straight line; two teeth on the maxillary; lower jaw with eight teeth arranged in a crescent (four on each side), smaller teeth on the sides.

Gill rakers 5 + 10.

Scales very regularly imbricate, without interpolated or omitted rows. Each scale with several slightly diverging striæ; anal sheath of a single row of scales along the base of the anterior rays; caudal naked.

Origin of dorsal nearer snout than caudal, 3.4 in the length; anal emarginate, its origin about equidistant from snout with the eighth dorsal ray; ventrals reaching anal, their origin a little in advance of that of the dorsal. Pectorals reaching beyond origin of ventrals.

A conspicuous bullet-shaped humeral spot, the blunt end forward, a faint dark streak extending down from it; a diffuse caudal spot occupying the entire width of the end of the caudal peduncle.

Dorsal line dark; sides profusely covered with pigment cells disappearing on the belly; cheeks and opercles dotted; fins dotted; upper and lower margin of caudal dark. Straw-colored in life, bases of dorsal, anal, and caudal lobes ochreous.



**Astyanax abramoides** sp. nov.

*Tetragonopterus abramis* (non Jenyns) Günther, Cat. Fish. Brit. Mus. V, 321, 1864 (British Guiana; Essequibo); Steind., Flussf. Südam. I, 8, 1879 (Orinoco, near Ciudad Bolivar).

Type, 112 mm. (No. 1028 Carnegie Museum Catalog of Fishes.) Tumatumari, Potaro River.

Cotypes, 86 specimens, 48–112 mm. Tumatumari. (C. M. Cat. No. 1029, *a-j*; I. U. Cat. No. 11727.)

Cotypes, 2 specimens, 99–126 mm. Potaro Landing. (C. M. Cat. No. 1030; I. U. Cat. No. 11728.)

Cotypes, 27 specimens, 60–126 mm. Kangaruma, Lower Potaro River. (C. M. Cat. No. 1031, *a-e*; I. U. Cat. No. 11729.)

Cotypes, 48 specimens, 56–108 mm. Amatuk Cataract, Lower Potaro River. (C. M. Cat. No. 1032, *a-j*; I. U. Cat. No. 11730.)

Cotype, 1 specimen, 54 mm. Rockstone, Essequibo River. (C. M. Cat. No. 1033.)

Cotype, 1 specimen, 46 mm. Gluck Island at Rockstone. (C. M. Cat. No. 1034.)

Cotypes, 2 specimens, 56–63 mm. Wismar, Demarara River. (C. M. Cat. No. 1035; I. U. Cat. No. 11731.)

Cotypes, 2 specimens, 51–64 mm. Christianburg, Demarara River. (C. M. Cat. No. 1036; I. U. Cat. No. 11732.)

Closely allied to *anterior* and *abramis*, but differing both in the color of the caudal peduncle and caudal.

Head 4; depth 2.4–2.5; D. 11; A. usually 28;<sup>5</sup> scales 9 or 10–43

Elliptical, dorsal and ventral outlines similar, without prominent humps; the profile slightly depressed over the eyes. Preventral area rounded, with small rather irregularly placed scales; postventral area narrowly rounded; predorsal area narrow, with a linear median naked area.

Occipital process equal to one-fourth of the distance from its base to the dorsal, bordered by four scales on its sides; skull smooth in cross-section, very convex; interorbital much broader than the eye in adult; frontal fontanel a little narrower than the parietal; margin of second suborbital very convex, leaving a naked area, which is widest below; to 51<sup>6</sup>–7 or 8; eye 2.5–3; interorbital 2.5–2.6.

<sup>5</sup> In those examined, one with 26, ten with 28, five with 29, three with 30.

<sup>6</sup> In those examined one with 43, four with 44, two with 45, four with 46, four with 47, one with 51.

maxillary equal to the eye ; four or five teeth in the front row of the premaxillary, the third withdrawn from the line of the rest ; five graduated teeth in the second row, their denticles in shallow crescents : maxillary with two or three minute teeth ; dentary with four large teeth abruptly followed by smaller ones on the sides.

Gill rakers 8 + 11.

Scales of the sides regularly imbricate, a few interpolated scales over the anal muscles ; anal sheath of a single row of scales along the base of the anterior rays ; caudal naked, a well-developed axillary scale ; lateral line but little decurved. Each scale of the sides with a few nearly parallel striæ.

Dorsal but little farther from snout than the ventral, nearer snout than caudal, its margin rounded, the highest ray about 3.75 in the length, the penultimate a little less than half as long as the highest. Anal emarginate, the second and tenth reaching the base of the eighteenth where depressed ; first anal ray below or behind the base of the last dorsal ray. Ventrals not reaching anal, pectorals to ventrals.

Highly iridescent, blue above, greenish to silvery below ; a club-shaped horizontal humeral spot, its pointed anterior end from the upper margin of the first scale of the lateral line along the row of scales above the lateral line to above the fifth scale of the line ; a dark vertical bar crossing the opercle, followed by a light bar, a second dark bar across the posterior part of the humeral spot, a second light bar and then a third dark bar shading into the profusely dotted sides. Cheeks profusely dotted ; a dark median line, most prominent in young specimens preserved in formalin, this line *not extending* along the sides of the caudal peduncle ; a black spot at the base of the caudal, its margins shading into the dusky caudal but not definitely continued to the end of the middle rays. These markings fading with age. In life all fins but pectorals tinged with orange or brick red.

***Astyanax potaroënsis* sp. nov.**

Type, 58 mm. (No. 1037 Carnegie Museum Catalog of Fishes.) Amatuk Cataract, Potaro River.

Cotypes, 12 specimens, 51–64 mm. Amatuk. (C. M. Cat. No. 1038, *a-c* ; I. U. Cat. No. 11733.)

Cotype, 1 specimen, about 59 mm. Kangaruma, Lower Potaro River. (C. M. Cat. No. 1039.)

Cotype, 1 specimen, 45 mm. Tukeit, Lower Potaro River. (C. M. Cat. No. 1040.)

Cotypes, 2 specimens, 47-49 mm. Erukin, Lower Potaro River. (C. M. Cat. No. 1041; I. U. Cat. No. 11734.)

Evidently allied to *bimaculatus* and *orthodus*. It is readily distinguished from *bimaculatus* by its emarginate anal, the broad caudal band and the absence of any stripe on the caudal peduncle. In the coloration of the sides it approaches *abramoides*, the humeral spot being less well defined, the black lateral line being absent. Its anal is distinctly shorter than that of *orthodus*.

Head 3.5; depth 2.6-3; D. 11; A. 27 or 28, rarely 29; scales 8 (rarely 9) - 37 to 38<sup>7</sup> - 6 or 7; eye 2.75; interorbital 3.<sup>7</sup>

Elongate, subrhomboidal, profile rising rapidly in front, then curved more gently to the dorsal; ventral profile regularly rounded. Preventral area convex, without a distinct median series of scales; postventral area narrowly rounded; predorsal area narrowly rounded, two scales in front of the dorsal, the median line otherwise naked to the occipital process.

Occipital process very narrow, its width not quite half its length, which is about  $\frac{1}{5}$  as long as the distance from its base to the dorsal, bordered by three scales on the sides. Interorbital smooth and convex; frontal fontanel a little narrower and a little shorter than the parietal; second suborbital leaving a considerable naked area which is widest below; mouth large, maxillary a little longer than the eye; normally four teeth in the outer series of the premaxillary, of which the third is withdrawn from the line of the rest; five teeth in the second series; maxillary with three small teeth; mandible with four large teeth in the dentary and abruptly minute ones on the side.

Gill rakers 6 + 14, those of the upper arch excessively minute, those of the lower arch about  $\frac{1}{3}$  the length of the eye.

Scales of the sides regularly imbricate, no interpolated scales over the anal; scales of the ventral surface less regularly imbricate; lateral line but little decurved; anal sheath composed of a single series of scales along the base of the anterior rays.

Ventrals but little nearer the snout than the dorsal, which is a little nearer to the snout than to the caudal; highest dorsal ray about 4 in the length. Anal emarginate, the second and fourteenth rays reaching the base of the twentieth ray. Ventrals not reaching anal, pectorals just to ventrals.

Coloration much as in *abramoides*, a dark bar crossing opercle, a

<sup>7</sup> In ten individuals five have 37, three have 38, one has 39, one 41 scales.

second bar some distance behind this in a light area, the second bar widest above the lateral line, where it forms an indistinct humeral spot ; a third bar shading into the thickly dotted sides ; cheeks thickly punctate, a dark dorsal streak. A black band crossing the base of the caudal and sometimes extending out along the outer rays. No dark line along the sides in formalin specimens, sometimes dark streaks up and down from the median line between muscle segments.

Genus PRISTELLA Eigenmann.

**Pristella aubynei** sp. nov.

Type, 50 mm. (No. 1042 Carnegie Museum Catalog of Fishes.)  
Lama Stop-off.

Cotypes, 203 specimens, 20-50 mm. Lama Stop-off. (C. M. Cat. No. 1043, *a-z* ; I. U. Cat. No. 11735.)

Cotypes, 50 specimens, 28-46 mm. Cane Grove Corner. (C. M. Cat. No. 1044, *a-j* ; I. U. Cat. No. 11736.)

Cotypes, 21 specimens, 35-49 mm. Maduni Stop-off. (C. M. Cat. No. 1045, *a-e* ; I. U. Cat. No. 11737.)

This species is very abundant in the canal from Cane Grove Corner to Maduni Creek Stop-off. I take pleasure in naming the species for Mr. Saint Aubyne, whose guest I was at Lama Stop-off and who did everything in his power to further the interests of my fishing expedition.

This species is placed in the genus with *Pristella riddlei* because in the technical characters they agree. There is every probability that they are not immediately descended from the same ancestor.

Head 3.75 ; depth 3.5 ; D. 10 ; A. 16-18 ; scales 6-31 to 33-3 rarely 4 ; 7 to 9 pores in the lateral line ; eye 2.33 ; interorbital 3.

Elongate, heavy forward ; ventral profile curved more than the dorsal, which is nearly straight to the dorsal, not depressed over the eye ; preventral area broad, rounded, postventral area keeled ; predorsal area narrowly rounded.

Occipital process triangular, very short, equal to  $\frac{1}{6}$  of the distance from its base to the dorsal. Fontanel widest at the base of the occipital process, anterior fontanel slightly shorter than the posterior, triangular, its anterior pointed end a little in advance of the middle of the eye. Second suborbital leaving a wide, naked area below a narrower one behind. Mouth oblique ; maxillary slender, its anterior margin nearly straight,  $2\frac{3}{4}$  in the head ; five teeth in the front series .

of the premaxillary of which the middle one is withdrawn from the line of the rest. Inner series of teeth large, multicuspid, graduate. Maxillary with numerous similar teeth; lower jaw with four or five graduate, multicuspid teeth in front and minute ones on the side.

Gill rakers about  $6 + 11$ .

Scales thin, not conspicuously regularly imbricate; each scale with several nearly parallel horizontal striæ; anal sheath composed of a single row of cells along the front of the fin; caudal lobes scaled for about one-eighth of their length.

Origin of ventrals a little nearer tip of last anal ray than snout, slightly in advance of the dorsal; penultimate dorsal ray more than half the length of the longest which is  $3\frac{3}{4}$  in the length. Anal emarginate, ventrals reaching anal; pectorals not to ventrals.

In life base of upper caudal lobe red, base of lower caudal lobe yellow, some yellow on under side of caudal peduncle and in front of anal. A circular spot about as large as eye on base of middle caudal rays. A dark line in front of dorsal, a series of spots behind it. A well-defined humeral spot on and over the second and third scales of the lateral line.

Genus *DEUTERODON* Eigenmann.

*Deuterodon pinnatus* sp. nov.

Type, 62 mm. (No. 1046 Carnegie Museum Catalog of Fishes.) Amatuk, Lower Potaro River.

Cotypes, 25 specimens, 32–75 mm., Amatuk, Potaro River. (C. M. Cat. No. 1047, 2–e; I. U. Cat. No. 11738.)

Cotypes, 2 specimens, 36–40 mm., Konawaruk, Essequibo River. (C. M. Cat. No. 1048; I. U. Cat. No. 11739.)

Cotypes, 19 specimens, 21–43 mm., Warraputa Cataract, Essequibo River. (C. M. Cat. No. 1049, a–c; I. U. Cat. No. 11740.)

Distinguished from all other Tetragonopterids by the pinnate black markings of the sides.

Head 4–4.3; depth 2.5–2.7; D. 10 or 11; A. 24–25, rarely 27; scales 6–36 or 37–4 or 5.

Compressed, subrhomboidal, profile slightly depressed over the eye; preventral area rounded, the scales large, a nearly regular median series; postventral area narrowly rounded, the anus directly in front of the anal; predorsal area narrowly rounded, with a median series of about nine scales.

Occipital process triangular, not quite one-fourth of the distance from its base to the dorsal; bordered by three scales; interorbital convex, fontanel narrow, the anterior shorter than the parietal; second suborbital deep, leaving a wide naked area; maxillary about 3.5 in the head; three or four teeth in the outer row of the premaxillary; five graduated teeth in the inner series, expanded at top, the denticles in a crescent, the middle one not notably larger or longer than the others; three or four similar teeth in the maxillary; dentary with eight to ten graduated teeth, similar to those of the premaxillary, but with longer median point; all the teeth brown tipped.

Gill rakers short  $6 + 10$ .

Scales regularly imbricate, no omitted or interpolated series; lateral line nearly straight; axillary scale small; anal sheath of a few scales in a single series along the base of the anterior rays. Caudal naked.

Ventrals in advance of the vertical from the dorsal; origin of dorsal in the middle or slightly in advance of the middle, its highest ray 3.75 in the length; twelfth anal ray  $\frac{2}{5}$  to about half as high as the highest, the anal margin concave or not; pectorals reaching slightly beyond origin of ventrals, ventrals not quite to anal.

Cheeks and opercles punctate; a well-developed humeral spot in a vertical humeral band; a second band in front of the dorsal shading into the much punctate sides; a black median line; from which black streaks branch along the muscle septa at every other myotome; a conspicuous, large caudal spot not continued to the end of the middle rays. Dorsal, adipose, caudal, and anal punctate, the latter sometimes most so along the base and tip.

There are also in the collection:

Cotypes, 41 specimens, 21-68 mm. Amaturuk. (C. M. Cat. No. 1050, *a-j*; I. U. Cat. No. 11741.)

Cotypes, 7 specimens, 20-69 mm. Waraturuk. (C. M. Cat. No. 1051, *a-b*; I. U. Cat. No. 11742.)

Cotypes, 3 specimens, 23-40 mm. Savannah Landing. (C. M. Cat. No. 1052; I. U. Cat. No. 11743.)

These differ from the typical specimens described in that the color along the side is in a dark band instead of pinnately distributed, continued to the caudal spot which is continued to the end of the middle caudal rays. A. 23-25. l. l. 37, 37, 38, 38, 39, 40 in the 6 largest from Amaturuk.

It is difficult to determine with certainty whether the two minute specimens from Savannah Landing belong to this species.

***Deuterodon potaroënsis* sp. nov.**

Type, 43 mm. (No. 1053 Carnegie Museum Catalog of Fishes.) Amatuk Cataract, Potaro River.

Cotypes, 5 specimens, 39–50 mm. Amatuk Cataract, Potaro River. (C. M. Cat. No. 1054; I. U. Cat. No. 11744.)

Cotypes, 3 specimens, 31–35 mm. Waratuk Cataract, Potaro River. (C. M. Cat. No. 1055; I. U. Cat. No. 11745.)

This species was taken by poison in a little side branch of the Waratuk Cataract and in the same way in a larger branch of the Amatuk Cataract.

Head 3.8–4; depth 3.2–3.5; D. 9 or 10; A. 24 or 25 (rarely 27); scales 6–37 to 40–4. Eye 2.5; interorbital equals eye.

Elongate, little compressed, heavy at shoulder; dorsal and ventral profiles equally arched, without hump or depressions; preventral area narrowly rounded, with a median series of scales; postventral area compressed to a narrow edge; predorsal area keeled, with a median series of about thirteen scales.

Occipital process about one-fifth of the distance from its base to the dorsal, bordered by three scales; head narrow, smooth above, slightly convex; frontal fontanel much shorter than the parietal, narrow; second suborbital leaving a naked area about one-third as wide as its own greatest width; maxillary longer than snout, but not quite equal to eye; premaxillary with three three-pointed teeth in the front row and five three- to five-pointed ones in the second. Denticles of the second row in a more or less open crescent; four or five maxillary teeth similar to those of the inner row of the premaxillary. Mandible with seven graduated multicuspid incisors, followed by one or two conical incisors.

Gillrakers 6 + 12.

Scales regularly imbricate, without interpolated or omitted rows; each scale with numerous nearly parallel striæ; anal sheath of a few scales in a single row along the base of the anterior rays. Caudal naked; lateral line but little decurved; a well-developed axillary scale.

Origin of dorsal a little nearer snout than caudal, its penultimate ray a little more than half as long as the longest ray which is about one-fourth of the length. Margin of anal straight, the rays graduate from

the anterior longer ones; ventrals very short, not reaching anal, a little nearer to the snout than the dorsal; pectorals reaching ventrals.

Markings in formalin specimens: each pore of the lateral line surrounded by black, the dots forming a conspicuous line; bases of two rows of scales below the lateral line over the abdomen and three or four rows of scales above the lateral line dark, the spots forming fainter longitudinal lines; margins of scales of the upper parts of the sides and the entire dorsal line very dark; a faint comma-shaped vertical humeral spot interrupted in the middle; a dark lateral band intensified in spots and ending in a caudal spot, which extends from a little above the lateral line to the lower margin of the caudal; ventral fins dusky.

Genus PHENACOGASTER Eigenmann.

**Phenacogaster megalostictus** sp. nov.

Type, 65 mm. (No. 1056 Carnegie Museum Catalog of Fishes. Tumatumari, Lower Potaro River.

Cotypes, 59 specimens, 42-77 mm. Tumatumari, Lower Potaro River. (C. M. Cat. No. 1057, *a-j*; I. U. Cat. No. 11746.)

Cotype, 1 specimen, 55 mm. Tukeit, Lower Potaro. (C. M. No. 1058.)

Cotypes, 5 specimens, 46-64 mm. Sand bank at Tukeit. (C. M. No. 1059; I. U. Cat. No. 11747.)

Cotypes, 4 specimens, 68-85 mm. Amatuk, Lower Potaro. (C. M. No. 1060; I. U. Cat. No. 11748.)

Cotypes, 16 specimens, 41-64 mm. Crab Falls, Essequibo. (C. M. No. 1061, *a-e*; I. U. Cat. No. 11749.)

Cotypes, 18 specimens, 36-64 mm. Rockstone, Essequibo. (C. M. No. 1062, *a-e*; I. U. Cat. No. 11750.)

Head 3.8-4; depth about 2.66; D. 11; A. 33.37, usually 35 or 36;<sup>8</sup> scales 6-33 to 36<sup>9</sup>-4 to 5; eye 2.33-2.66; interorbital 3½-4.

Elongate rhomboidal, heavy forward, the tail much compressed; profile compressed over the eye, arched in front of the dorsal; pre-ventral area flat, with two series of large scales overlapping along the middle, a small scale in the angle of each pair of the overlapping scales, except the two pairs between the pectorals; midline of postventral area naked; predorsal area bluntly keeled, with about ten median scales.

<sup>8</sup> Of those examined three with 33, four with 34, six with 35, seven with 36 and two with 37.

<sup>9</sup> Of those examined two with 33, three with 34, eight with 35, ten with 36.



Occipital process one fourth or one-fifth of the distance from its base to the dorsal, bordered by four scales on the sides; interorbital flat, the upper margin of large eye on a level with the middle of interorbital; frontal fontanel as long as the parietal, narrower than the parietal, reaching to above the anterior margin of the pupil; second suborbital corrugate, leaving a wide naked margin; premaxillary maxillary border without a distinct angle, moderately oblique; maxillary of nearly equal width throughout, not slipping under or over the first suborbital; snout blunt, the lower included.

Mandible with four to six narrow graduate teeth, with a large central and a minute lateral cusp on each side; sides of mandible with about ten minute teeth; premaxillary with four to seven teeth in a line parallel with the second row, which consists of about five to seven three-lobed and one to three conical teeth; maxillary with eleven to sixteen conical or three-lobed teeth along about half the length of the maxillary.

Gillrakers  $4 + 9$ .

Scales everywhere regularly imbricate, without interpolate scales; each scale with several radiating striæ; lateral line slightly decurved; anal sheath of a single series of graduate scales along the base of the first rays; caudal naked; axillary scale small.

Origin of the dorsal a little in advance of the middle, pointed, the rays very rapidly decreasing from the highest, which is equal to about a third of the length.

Anal at origin and the third dorsal ray about equidistant from the snout, emarginate; ventrals extending slightly beyond origin of anal; pectorals beyond base of ventrals.

Straw-colored, a silvery lateral band, slightly iridescent. A large conspicuous, sub-circular spot over the sixth to eighth scale of the lateral line occupying the width of two scales (this spot frequently with a lunate encroachment in front); upper part of opercle and area below eye spotted, sometimes the rest of the cheek also spotted; a black median line more or less evident; a large caudal spot extending to near the middle (sometimes further) of the median caudal rays; scales of the back always broadly margined with black, those of the flanks less so; above the anal the markings of the margin of the scales mixed with the lines of chromatophores following the muscle segments; tips of caudal nigrescent; anal nearly uniformly dotted, or the base and tip dotted, the rest hyaline; first anal rays milk-white.

All the markings except the humeral spot may be very faint. Dorsal, caudal, and anal red in life.

Vertebrae 12 + 19.

**Phenacogaster microstictus** sp. nov.

Type, 48 mm. (No. 1063 Carnegie Museum Catalog of Fishes.) Tumatumari, Lower Potaro.

Cotypes, 7 specimens, 28 mm. Konawaruk, Essequibo River. (C. M. Cat. No. 1064, *a-c*; I. U. Cat. No. 11751.)

Cotype, 1 specimen, 29 mm. Rockstone, Essequibo River. (C. M. Cat. No. 1065.)

Cotypes, 4 specimens, about 35 to about 46 mm. Crab Falls, Essequibo River. (C. M. Cat. No. 1066; I. U. Cat. No. 11752.)

Head 4; depth 2.8; D. 11; A. 37-40, most often 39; scales 6-38 or 39-5; eye 2.5; interorbital 3.5.

Only one or two small scales in the angles of the overlapping scales of the ventral surface; interorbital slightly convex. Maxillary with about seventeen teeth along most of its length; premaxillary with four tricuspid and five conical teeth in the inner series; two or three teeth similar to the larger ones and possibly sometimes a few conical teeth in the outer series; mandible with seven larger and a number of minute teeth.

Scales with concentric striæ, very few, or inconspicuous, radial striæ.

Straw-colored; a very faint and small humeral spot over the seventh scale of the lateral line; a dark deep-lying line; two small deep-lying black spots at the bases of the caudal lobes; no caudal spot; caudal, except the middle of the base of the lobes, dusky; base and margin of anal dotted, the middle hyaline; sides of head and body profusely dotted, the dots on the flanks and back margining the scales, the margin consisting of a single row of chromatophores on the flank, of several rows on the back; dots over the anal muscles following the intermuscular septa. Cotypes all very much lighter.

In one of the Crab Fall specimens the humeral spot is conspicuous owing to the expansion of the chromatophores.

Genus CREAGRUTUS Günther.

**Creagrutus melanzonus** sp. nov.

Type, 44 mm. (No. 1067 Carnegie Museum Catalog of Fishes.) Crab Falls.

Cotypes, 2 specimens, 27 mm. Warraputa. (C. M. Cat. No. 1068; I. U. Cat. No. 11753.)

Cotypes, 3 specimens, 25 to about 38 mm. Tumatumari. (C. M. Cat. No. 1069; I. U. Cat. No. 11754.)

Head 4; depth  $4\frac{1}{3}$ ; D. 10; A. 11; scales 6-36-2.5; eye 2.6; interorbital 3.5.

Elongate, heaviest above middle of pectoral, the width about one-half the depth; preventral area broadly rounded, postventral rounded; predorsal area broad, with an obscure keel; a median series of about ten scales.

Occipital process very short, about one-seventh of the distance of its base from the dorsal; skull smooth, but slightly convex; frontal fontanel triangular, nearly as long as the parietal; mouth rounded, projecting beyond the lower jaw; cheeks long and low, the second suborbital about twice as long as broad, its convex margin leaving a considerable naked area except at a point of contact with the lower limb of the operculum.

Maxillary-premaxillary border forming a simple, concave curve; horizontal extent of the premaxillary about equal to the length of the maxillary, which is equal to half the length of the eye. Nine teeth in each premaxillary, those in the maxillary similar and continuous with the last of the premaxillary teeth; outer teeth of the premaxillary conical, inner tricuspid; about seven tricuspid teeth in the dentary, of which the first three are large, the rest minute; tips of all the teeth, except those of the maxillary and those of the sides of the lower jaw, brown. Lower jaw short, less than length of eye.

Gillrakers 4 + 10.

Scales very thin; anal sheath none, caudal lobes naked, except for a few large scales on the lower lobe, axillary scale well developed.

Origin of dorsal in advance of the middle; origin of anal in advance of that of the dorsal; origin of anal behind the last ray of the dorsal; adipose slightly behind base of last dorsal ray; ventrals not reaching anal; pectorals not nearly to ventrals.

Straw-colored, a bright silvery band; first suborbital, cheeks, and opercle behind eye, snout, and upper part of head dotted. A continuous curved band crossing third and fourth scale of the lateral line; scales of the back with one to several series of dots on the margin; silvery lateral band underlaid with a dotted stripe, a small caudal spot

at the base of the middle rays; a pair of rows of dots from the anus along the sides of the anal, a single series of dots behind the anal.

Genus *BRYCONAMERICUS* Eigenmann.

***Bryconamericus hypheson*** sp. nov.

Type, 37.5 mm. (No. 1070 Carnegie Museum Catalog of Fishes.) Tumatumari, Lower Potaro.

Cotypes, 10 specimens, 34–36 mm. Tumatumari. (C. M. Cat. No. 1071, *a-b*; I. U. Cat. No. 11755.)

Most closely related to *stramineus*.

Head 4.5; depth 4; D. 9; A. 16; scales 4–36–2; eye 2.66–2.75; interorbital equals eye.

Slender, but compressed, greatest depth over tip of pectorals, ventral and dorsal outlines equally arched; preventral area rounded, with normal scales; postventral area short, compressed; predorsal area rounded, with a regular series of ten scales.

Occipital process very short, only about one-eighth of the distance between its base and the dorsal, bordered by two scales on the sides; skull convex, smooth, a groove above the eye just within the orbital rim; frontal fontanel very short, triangular, not half as long as the parietal; snout blunt, the lower jaw included; mouth small, the maxillary a little more than half the length of the eye; cheeks not very wide; entirely covered by the second suborbital; maxillary with three or four broad, five-pointed teeth; premaxillary with two series of five-pointed teeth; four teeth in the inner row, four to six in outer row; the teeth of the outer row smaller than those of the inner row; the inner series parallel with the outer except that the third tooth is withdrawn from the line of the rest; dentary with seven or eight graduated five-pointed incisors.

Scales very regularly imbricate without interpolated or omitted scales; about three scales on the base of each caudal lobe; scales of the sides usually without, those of the tail sometimes with a single line; anal sheath very narrow, consisting of a single series of minute scales extending along the greater part of the base of the fin; lateral line decurved.

Origin of dorsal a little behind the middle of the body, over the middle of the ventrals; highest dorsal ray  $4\frac{1}{2}$  in the length; adipose fin behind the vertical from the base of the last anal ray; caudal forked, the longest rays a little greater than the depth; anal slightly

emarginate; ventrals reaching anal, pectorals to ventrals, or but a trifle shorter.

Hyaline; a conspicuous silvery lateral band; sides of head silvery; a vertical humeral spot crossing the second scale of the lateral line; three parallel dark lines along the middle of the back; scales of the back margined with several rows of chromatophores; chromatophores along base of anal and scattering ones on the sides, a band of chromatophores below the silvery band; a narrow dark band from the tip of the first (short) dorsal ray to the tip of the penultimate, tips of the longer rays and bases of all the rays hyaline; caudal everywhere punctate, except at the tips of the rays and a triangular patch adjoining the middle rays above and below, these parts hyaline; tips of highest anal rays milky; tips of the other rays dark, the dark continued across the longest rays at the same level; pectorals and ventrals more or less dotted.

**Holobrycon** gen. nov.

Type: *Brycon pesu* Müller & Troschel.

This genus is a *Brycon* without fontanels.

*Brycon pesu* was collected at all stations between Bartica and Tumatumari.

**Triurobrycon** gen. nov.

Type: *Brycon lundii* Lütken.

This genus is distinguished from *Brycon* by the elongation of the middle caudal rays into a point.

Subfamily CRENUCHINÆ.

The Crenuchinæ are Aphiocharacinæ with an increased number of dorsal rays. They resemble some of the genera of Pœciliidæ.

But a single species has been recorded, *Crenuchus spilurus* Günther, from the Amazon and the Guiana lowlands.

I found a second species representing a second genus very abundant on the Guiana plateau and just below the Kaieteur Fall.

The genera are distinguished by the following characters:

a. An adipose fin; mouth large, maxillary extending to below middle of eye.

*Crenuchus* Günther.

aa. No adipose fin; mouth small, maxillary extending to below anterior margin of eye.

*Pœcilocharax* Eigenmann.

**Pœcilocharax bovalii**<sup>10</sup> gen. et sp. nov.(Native names *Guabia* and *Wabéak*.)

Types, 43 mm. ♂ and 40 mm. ♀. (No. 1136 Carnegie Museum Catalog Fishes.) Creek at Savannah Landing.

Cotypes, over two hundred and twenty specimens, Creek at Savannah Landing. (C. M. C. No. 1137, *a-z*; I. U. Cat. No. 11686.)

Cotypes, 3 specimens, 34-45 mm. Holmia. (C. M. C. No. 1138, *a*; I. U. Cat. No. 11671.)

Cotype, 1 specimen, 38 mm. Two hours below Holmia. (C. M. C. No. 11390.)

Cotypes, 63 specimens, 22-47 mm. Creek at Tukeit. (C. M. C. No. 1040, *a-z*; I. U. Cat. No. 11672.)

Head 3-3.5; depth 3.2-3.3; D. 16; A. 11; scales 27-30, 9 between dorsal and ventral; 6 with pores; eye equal to the snout, 3.5-4 in the head; interorbital almost equal to the eye.

Compressed, ventral profile gently and evenly arched. Dorsal outline rather steep to near the dorsal fin. Preventral and predorsal areas narrowly rounded, scaled.

Occipital process short, the fontanel large, oval, separated from the small frontal fontanel by a convex bridge on a level with the rest of the skull; suborbitals narrow, leaving most of the cheek naked. Mouth small, maxillary-premaxillary border 2.8 in the head; maxillary not quite equal to the eye. Teeth all long, tricuspid, in a single series, about eleven teeth in the premaxillary, about five teeth in the maxillary

Gillrakers 7 + 9, about equal to the pupil.

Origin of dorsal nearer snout than caudal, its rays of nearly uniform height, none prolonged. Anal considerably shorter than the dorsal, its *middle* rays highest, reaching in the male to middle of caudal; origin of anal under one of the last four dorsal rays; origin of ventrals and dorsal equidistant from snout; tips of ventrals reaching to the anal in male, the ventrals slightly shorter in the female. Pectorals not quite reaching ventrals.

<sup>10</sup> I take pleasure in naming this species for the family Bovalius. Dr. Bovalius was for several years in charge of the Essequibo Exploration Company, stationed at Holmia on the Guiana Plateau. His brother Dr. Ed. Bovalius is at present in charge of the Company's interests at Tumatumari.

Except for the kindly help of Dr. Edwin Bovalius and Mr. G. Linnell my trip from Tumatumari to the Kaieteur and beyond would have been practically impossible.

Scales cycloid, regularly imbricate, no interpolated scales. No scales on the anal, those along the base forming a sheath. Caudal naked. A very minute axillary scale.

Back dusky, margined by a darker stripe from above eye to upper caudal lobe. A light band from upper part of eye, becoming widest under the middle to end of dorsal in the ♂, widest on caudal peduncle, contracted on caudal fin in the ♀. A dark band from eye to upper part of gill-opening, thence descending to meet its fellow on the lower surface and edge of caudal peduncle, thence curved up on the caudal to tips of its middle rays; this band more intense, jagged, and more strongly decurved in the male than in the female. Sides of caudal peduncle with a rusty spot on each scale (♀); dorsal in both sexes nearly uniform, darkest in the male. Upper margin of caudal geranium-red, most intense in the male, below which is a continuation of the upper dark band of the sides, fading out toward tip of upper lobe and with oval hyaline spots; a wedge-shaped area at middle of caudal and all but the base of some of the rays of the lower lobe hyaline. Tip of anal in male scarlet, below which is a broad dark band; base and last rays hyaline. Last rays of anal (♀) hyaline, otherwise dark with conspicuous round or oval hyaline spots. Ventrals slightly dusky. Pectorals hyaline.

#### Subfamily NANNOSTOMATINÆ.

The Nannostomatinæ are minute fishes resembling *Zygonectes* and the North American darters.

The genera of the subfamily are distinguished as follows:

- a. A triangular occipital process; a small, circular occipital fontanel. Adipose fin well developed.
  - b. Lateral line complete; teeth usually 3-pronged. *Characidium*, Reinhardt 1.
  - bb. Lateral line incomplete; teeth conical. *Microcharax*<sup>11</sup> Eigenmann 2.
- aa. Skull truncate; no occipital process; no fontanel; teeth usually incisor-like, notched at tips. No lateral line.
  - c. No adipose fin.
    - d. Five or six scales in a transverse series; 20-28 in a median-lateral series; jaws equal; teeth broad at top, with five equal points. *Nannostomus*<sup>12</sup> Günther 3.
  - cc. Adipose fin well developed; scales five in a transverse series.

<sup>11</sup>Type *Nannostomus lateralis* Boulenger.

<sup>12</sup>As here understood the genus *Nannostomus* consists of *N. beckfordii* Günther, the new species described in this paper, and *Nannostomus anomolum* Steindachner.

- e.* Pectorals normal; teeth broad-tipped, 5-pointed, the points equal or sub-equal. *Pacilobrycon*,<sup>13</sup> Eigenmann 4.  
*ee.* Pectorals fleshy flaps, edged with filaments; teeth 3- or 5-pointed, the middle point much the longest. *Archicheir*, Eigenmann 5.

Genus CHARACIDIUM Reinhardt.

The species of *Characidium* of British Guiana fall into two groups. (1) Rock-inhabiting *Etheostoma*-like species, highly colored, mountaineers, with the outer pectoral rays thickened. (2) Pellucid species, found on the sand-banks and resembling *Ammocrypta* in general appearance.

**Characidium laterale** sp. nov.

Type, 37 mm. (No. 1141 Carnegie Museum Catalog of Fishes.) Amatuk.

Cotypes, 3 specimens, 29-35 mm. Amatuk. (I. U. Cat. No. 11673.)

A *Zygonectes*-like *Characidium*.

Head 3.75-4; depth 6; D. 11 or 12; A. 8; scales 4-36-2.

Eye equal to snout, 3.75 in head. Teeth three-pointed. Pectorals reaching ventrals, its outer rays thickened; ventrals three-fourths to anal; fourth anal ray reaching considerably beyond tip of last, but not to the caudal fulcra. Base of dorsal reaching half way to middle of adipose, about 7 in the length.

A broad band from tip of snout to base of middle caudal rays, bordered by a light streak above; back brown, with darker cross shades; a small spot just above base of first ventral ray; a dark spot or streak on the chin, another anterior to the anal; a dark spot on either side of base of anal, ventral surface otherwise plain. A dark spot anterior to the dorsal and one in front of the adipose fin. Fins without definite markings.

**Characidium vintoni**<sup>14</sup> sp. nov.

(Native name, *Tunatruic*.)

Type, 76 mm. (No. 1142 Carnegie Museum Catalog of Fishes.) Shrimp Creek.

Cotypes, 52 specimens, 53-82 mm. Shrimp Creek. (C. M. Cat. No. 1143, *a-j*; I. U. Cat. No. 11674.)

<sup>13</sup> The genus *Pacilobrycon* consists of the species described in this paper and *Nannostomus trifasciatus* Steindachner, *Nannostomus eques* Steindachner, and *Nannostomus unifasciatus* Steindachner.

<sup>14</sup> For Mrs. C. Vinton, one of the few ladies who have visited the habitat of this species.



Resembling *Hadropterus*:

Head 4-4.25; depth 5.4-6; D. 11; A. 8; scales 4-37-2½, 9 median scales anterior to dorsal; eye 1.66 in the snout, 4.6 in the head, about 1 in the interorbital; bony interorbital equals .5 diameter of eye; teeth obscurely three-pointed.

Snout long, pointed. Pectorals, with the tips of the outer rays thickened, not reaching ventrals; ventrals not to anal; highest anal ray equals length of caudal peduncle, not reaching the fulcra of the caudal; third dorsal ray reaching tip of last; base of dorsal equals one-half its distance from the adipose fin, about 8 in the length; tip of third dorsal ray reaching much beyond tip of the last ray.

A conspicuous band from the tip of the snout to the middle of the caudal, bordered above by an interrupted yellowish band about half its width; a dark band along middle of the back, another between it and the lateral band; a dark streak parallel to the lateral band below it in front of the caudal peduncle. About eight bands across the back to the lateral band, sometimes continued below the lateral band directly, or with a shift backward or forward. Lower surface silvery; opercle, angle of preopercle, and a band below the eye sometimes dark; axil and spot above origin of ventrals and a streak along base of anal dark; lower surface of chin pale or dark. All these markings sometimes obscured by increased pigmentation. Dorsal nearly uniform. Caudal lobes with an oblique black bar; area between this bar and the basal spot of the middle rays pigmentless, faintly dusky posterior to the black bars. Tips of outer rays of pectoral and ventral and the first rays of the anal swollen, these fins hyaline, except for a few color-cells along the middle of the middle rays.

This species rivals the darters in its coloration.

***Characidium blennioides* sp. nov.**

(Native name, *Seesu*.)

Type, 52 mm. (No. 1144 Carnegie Museum Catalog of Fishes.) Erukin, tributary of the Potaro above Kangaruma.

Cotypes, 6 specimens, 43-52 mm. Erukin (C. M. Cat. No. 1145, *a-b*; I. U. Cat. No. 11675.)

Cotype, 1 specimen, 55 mm. Tukeit. (C. M. Cat. No. 1146, *a*.)

Cotypes, 2 specimens, 42-54 mm. Creek above Potaro Landing. (C. M. Cat. No. 1147, *a*; I. U. Cat. No. 11676.)

Cotypes, 5 specimens, 43-49 mm. Tumatumari. (C. M. Cat. No. 1148, *a-b*; I. U. Cat. No. 11677.)

Cotypes, 12 specimens, 33-47 mm. Crab Falls. (C. M. Cat. No. 1149, *a-b*; I. U. Cat. No. 11678.)

Cotypes, 13 specimens, 31-60 mm. Amatuk. (C. M. Cat. No. 1150, *a-d*; I. U. Cat. No. 11679.)

Resembling *Etheostoma caeruleum*.

Head 3.75-4; depth 4.5-4.75; D. 11; A. 8; scales 4-32 to 34-2; seven median scales anterior to the dorsal; eye 1.1 in snout, 3.75 in head; bony interorbital .5 diameter of eye. Teeth three-pointed, the middle point longest.

Pectorals with the tips of the outer rays thickened, reaching ventrals, ventrals to anal; third anal ray reaching fulcrum of the caudal, but scarcely beyond the tip of the last ray. Base of dorsal about 1.2 in its distance from the adipose fin, 5.5 in the length; third dorsal ray reaching base of the last.

Adult nearly uniform blue-black, the ventral surface being but little lighter. Margin of adipose and caudal, outer edges of ventrals and pectorals white. Dorsal, caudal, anal, and ventrals conspicuously barred with white and black. Pectorals, exclusive of the tips of the outer four rays, bluish-black.

Younger specimens and lighter colored ones show about seven cross-bands and more or less incomplete rows of light spots following the rows of scales. A dark band forward from eye; a narrower one downward. In the youngest specimen from Amatuk the pectoral, like the ventral and anal, has four dark bands.<sup>15</sup>

#### **Characidium zebra** sp. nov.

Type, 52.5 mm. to base of caudal. (No. 1151 Carnegie Museum Catalog of Fishes.) Maripicru, a branch of the Ireng.

Cotypes, 6 specimens, 47-55 mm. Maripicru. (C. M. Cat. No. 1152, *a-b*; I. U. Cat. No. 11680.)

Cotypes, 14 specimens, 32-44 mm. Maripicru? (C. M. Cat. No. 1159; I. U. Cat. No. 11687.)

Closely allied to *C. fasciatum*.

Head 4.25-4.5; depth 5-5.3; D. 11; A. 7 or 8; scales 4-35 or 36-3½; 9 scales before the dorsal. Eye equals snout, 3.75-4 in the head; bony interorbital 1.3-1.5 in the eye. Teeth three-pointed, the middle point longest.

<sup>15</sup> A smaller specimen from this place, 23 mm. long, has a single band on the pectorals and the ventrals. It is crushed and I am not certain of its identification.

Pectorals with the tips of the outer rays thickened, reaching ventrals; ventrals not to anal; highest anal ray a little less than the length of the caudal peduncle, reaching a little beyond tip of the last ray, but not to caudal fulcra; base of dorsal fin reaching over half way to the adipose, 6 in the length, the third ray extending about half way to tip of last.

Straw-color; a narrow black band from tip of snout to base of middle caudal rays, where it ends near a small black spot; about ten brown cross-bands, the fifth encircling the entire body at tips of ventrals, in the type, sometimes they become double along the sides, giving the appearance of many narrow bands. Back dusky, the centers of the scales light. Opercle and lower lip dark. Ventral surface colorless. Dorsal with a spot behind and near the base of each ray, beginning with the fourth; chromatophores along the branched part of the rays; other fins hyaline, without distinct markings.

***Characidium pellucidum* sp. nov.**

Type, 39 mm. (No. 1156 Carnegie Museum Catalog of Fishes.) Gluck Island.

Cotype, 37 mm. Gluck Island. (I. U. Cat. No. 11683.)

Resembling *Ammocrypta pellucida*.

Head 4.33; depth 7; D. 11; A. 8; scales 3-36-2, nine in front of dorsal. Eye a little longer than snout, 3.75 in head; bony inter-orbital a little less than half length of head. Teeth with three large points.

Pectorals reaching ventrals, its outer rays not thickened; ventrals not to anal; anal rounded, the third ray reaching a little beyond tip of last, but not nearly to caudal; dorsal truncate, the third ray reaching a little beyond middle of last; base of dorsal  $6\frac{3}{4}$  in the length, equal to one-half its distance from tip of adipose.

Pellucid in life. Middle of sides with 27-30 stellate chromatophores, one or more of which may have slipped up or down from the line of the rest; a few smaller cells dorsad of the lateral series; back with about sixteen cross-bars, which do not encroach on the sides. A dark band forward from eye to end of snout. Upper part of cheek and opercle each with a chromatophore; top of head with a few chromatophores; ventral parts clear except a patch of chromatophores between the pectorals, one between the ventrals and a patch at origin of anal; a dark median line between tip of ventral and another behind the anal

fin. A dark band about two-thirds up on the dorsal and one across base of the anterior rays, both very faint; caudal with a few faint dark spots; fins otherwise hyaline.

**Characidium pteroides** sp. nov.

Type, 28 mm. (No. 1157 Carnegie Museum Catalog of Fishes.) Konawaruk.

Cotypes, 2 specimens, 25–27 mm. Konawaruk. (I. U. Cat. No. 11684.)

Cotype, 1 specimen, 23 mm. Rockstone. (C. M. Cat. No. 1158.)

Cotype, 1 specimen, 24 mm. Wismar. (I. U. Cat. No. 11685.)

A characin burrowing in sand, very similar to *C. pellucidum*.

Head 4; depth 6; D. 11; A. 7; scales 4–36–2. Eye considerably longer than snout, a little over 3 in the head; teeth three-pointed.

Pectorals about reaching ventrals, the tips of its outer rays not thickened; ventrals not nearly to anal; anal rounded, not nearly reaching the caudal fulcra. Third dorsal ray reaching about to second third of the last; base of dorsal 1.3 in its distance from the adipose, 6 in the length.

Hyaline. Sides with numerous crescents of brown; back with about thirteen cross-bars made up of crescents; in places two opposing crescents form ocelli. A dark band from eye to end of snout; a black bar through the opercle; a deep-seated spot on angle of preopercle; a streak, sometimes broken, backward from eye; an interrupted black line along the ventral surface, concentrated between the ventrals and in front of the anal. Faint markings on dorsal, caudal, and anal; fins otherwise hyaline.

**Characidium catenatum** sp. nov.

Type, 38 mm. (No. 1153 Carnegie Museum Catalog of Fishes.) Warraputa.

Cotypes, 12 specimens, 32–35 mm. Rockstone sandbank. (C. M. Cat. No. 1154, *a–d*; I. U. Cat. No. 11681.)

Cotypes, 2 specimens, 37, 38 mm. Crab Falls. (C. M. Cat. No. 1155, *a*; I. U. Cat. No. 11682.)

A sand-burrowing characin, resembling *Ammocrypta pellucida*.

Head 4–4.2; depth 6–6.2; D. 10 or 11; A. 8; scales 4–38–3, 10 before the dorsal. Eye a little longer than snout, 3.3 in head; bony interorbital about two in eye. Teeth conical.<sup>16</sup>

<sup>16</sup> This species stands alone of those from Guiana in having single-pointed, strictly conical teeth.

Pectorals reaching ventrals or not, the tips of the outer rays not thickened; ventrals not to anal; anal rounded, the fifth ray highest, reaching slightly beyond tip of last, not nearly to caudal; dorsal low, subtruncate, the third ray not quite reaching tip of last; base of dorsal extending half way to tip of adipose, 7.75 in the length.

Pellucid in life. Sides of head and body more or less iridescent; a dark stripe from eye to end of snout; about ten dark brown cross-bars, most intense on back and along the lateral line; the centers of the scales of the bars colorless, giving each band a chain-like appearance; a few chromatophores on the margins of other dorsal scales. A minute, round black spot at base of caudal, surrounded by a hyaline area, which is bounded posteriorly by a faint color halo; fins otherwise all hyaline. A blackish median line from behind ventrals to the vent.

***Nannostomus marginatus* sp. nov.**

Type, 26 mm. (No. 1171 Carnegie Museum Catalog of Fishes.) Maduni Creek.

Cotypes, 10 specimens, 21–25 mm. Maduni Creek. (C. M. Cat. No. 1172, *a–d*; I. U. Cat. No. 11696.)

Cotypes, 5 specimens, 19–24 mm. Lama Stop-Off. (C. M. Cat. No. 1173, *a, b*; I. U. Cat. No. 11697.)

Cotypes, 2 specimens, 22, 23 mm. Crab Falls. (C. M. Cat. No. 1174, *a*; I. U. Cat. No. 11698.)

Cotypes, 2 specimens, 24 mm. Rockstone sand bank. (C. M. Cat. No. 1175, *a*; I. U. Cat. No. 11699.)

Cotypes, 5 specimens, 25–31 mm. Gluck Island. (C. M. Cat. No. 1176, *a, b*; I. U. Cat. No. 11700.)

Cotypes, 2 specimens, 27, 31 mm. Christianburg canal? (C. M. Cat. No. 1177, *a*; I. U. Cat. No. 11701.)

Cotypes, 19 specimens, 21, 22 mm. Cane Grove Corner. (C. M. Cat. No. 1178, *a–f*; I. U. Cat. No. 11702.)

Most nearly related to *N. trifasciatus* Steindachner.

Head 3.6; depth 3.4; D. 10; A. 11 or 12; scales, 5 between D. and V., 9 or 10 before the dorsal, 21 in a median lateral series. Eye 3 in the head; snout 4 in the head; interorbital equal to the eye.

Short and chubby, the snout especially short, the jaws equal. Origin of the dorsal over the insertion of the ventrals; pectorals reaching a little more than half way to the ventrals; ventrals half way to middle of anal. No adipose fin.

Back chocolate, the median line darkest ; three black lateral stripes, a median golden stripe and a golden stripe shading to silvery ventrad ; belly white. A crimson spot on middle of the dorsal and of the ventral fins ; a crimson streak bordering the upper margin of the middle black band from above middle of the pectoral to middle of the dorsal ; caudal suffused with orange ; anal posteriorly orange-red ; iris red above.

The upper two black bands converge on the caudal fin, the middle one extends from end of snout and mandible to base of the lower caudal lobe ; the lowest extends from near the mouth along the sub-orbital, below the pectoral to the anal, and is continued upon the anterior rays of the anal and sometimes margins the rest of the fin. Anterior dorsal ray, or rays, dark.

**Nannostomus minimus** sp. nov.

Type, 21 mm. (No. 1165 Carnegie Museum Catalog of Fishes.) Erukin.

Cotypes, 2 specimens, 20 and 21 mm. Erukin. (I. U. Cat. No. 11691.)

Cotype, 1 specimen, 22 mm. Amatuk. (C. M. Cat. No. 1166, *a*.)

Head 3.6 ; depth 4.66 ; D. 9 ; A. 10 ; scales 7 in front of dorsal, 5 between dorsal and ventrals, 21 in a lateral series. Eye greater than snout, 3 in the head ; interorbital equal to the eye.

Origin of dorsal over origin of ventrals ; pectorals reaching half way to middle of ventrals ; ventrals to anal ; origin of anal on a vertical from middle of last dorsal ray. No adipose fin.

Back uniform gray, median darker line wanting ; a light band from end of snout to upper part of middle of caudal ; a black band from end of mandible to lower part of middle of caudal, darkest above pectorals and above middle of ventrals ; a few chromatophores along base and in front of the anal fin ; fins mostly hyaline, their chromatophores few.

**Nannostomus simplex** sp. nov.

Type, 25 mm. (No. 1167 Carnegie Museum Catalog of Fishes.) Lama Stop-Off.

Cotype, 29 mm. Lama Stop-Off. (I. U. Cat. No. 11692.)

Closely allied to *N. auratus* and *N. minimus*.

Head 3.5 ; depth 4.5 ; D. 10 ; A. 10 ; scales 5 between D. and V., 9 before D., 24 in a lateral series. Eye a little greater than snout, 3 in the head, equal to the interorbital.

Pectorals reaching half way to second third of the ventrals, ventrals half way to tip of last anal ray; origin of anal under tip of last dorsal ray. No adipose fin.

Back dark gray with a median dark line; a light band from snout to base of upper rays of middle of caudal; a black band through mandibles and snout to base of lower caudal and continued on the two middle rays; ventral surface plain, except for a spot between the tips of the ventrals; chromatophores of the lateral band scattered above the pectorals and above the front part of the anal.

***Pæcilobrycon* gen. nov.**

Type: *Pæcilobrycon harrisoni* sp. nov.

***Pæcilobrycon harrisoni* sp. nov.**

Type, 55 mm. (No. 1160 Carnegie Museum Catalog of Fishes.) Canal at Christianburg.

Cotypes, 2 specimens, 45 and 51 mm. Canal at Christianburg. (I. U. Cat. No. 11709.)

Head 4; depth 5.25; D. 9; A. 10; scales 5 between D. and V., 26 or 27 in a median series, 11 or 12 in front of the dorsal; eye 3 in the head; upper jaw projecting. Snout very little greater than eye; interorbital a little less than eye.

Adipose well developed, behind tip of anal; origin of dorsal slightly posterior to that of the ventrals. Pectorals reaching half way to ventrals; ventrals slightly more than half way to anal.

Back chocolate; a broad, straw-colored band from tip of snout to middle of upper caudal lobe; a narrow black band from tip of mandible through eye along lower part of peduncle to near tip of shortest caudal ray and a few rays inferior to it. Ventral surface silvery, dotted from midway of the ventrals to the anal, the dots continued over the lateral band above the anal. A spot on either side of snout, the iris dorsad, a line along base of anal, and a streak above and below the caudal band, crimson. An oblique, dotted bar across the yellow lateral band just above tip of pectoral. Last anal rays dark.

For J. B. Harrison, M.A., C.M.G., F.G.S., Government Geologist, Georgetown, British Guiana, who assisted the expedition in various ways.

***Pæcilobrycon auratus* sp. nov.**

Type, 32 mm. (No. 1161 Carnegie Museum Catalog of Fishes.) Konawaruk.

Cotypes, 16 specimens, 27-34 mm. Konawaruk. (C. M. Cat. No. 1162, *a-d*; I. U. Cat. No. 11688.)

Cotypes, 3 specimens, 27 mm. Rockstone sandbank. (C. M. Cat. No. 1163, *a*; I. U. Cat. No. 11689.)

Cotypes, 8 specimens, 25-33 mm. Gluck Island. (C. M. Cat. No. 1664, *a, b*; I. U. Cat. No. 11690.)

Head 3.75; depth nearly 5; D. 10; A. 11; scales 5 between D. and V., 23 along a median series, 10 in front of dorsal.

Eye 3 in head, a little less than snout, greater than interorbital, upper jaw projecting.

Adipose fin over about middle of last anal ray; dorsal beginning behind the vertical from the origin of the ventrals. Pectorals reaching half way to middle of ventrals, ventrals half way to base of last anal ray.

Upper jaw projecting, mid-dorsal line from head to adipose chocolate, on either side of which is a straw-colored stripe confluent into a median line on the head to the tip of the snout. A similar chocolate stripe on sides bounded below by another straw-colored stripe, both concurrent with the back; ventrad of the last is a chocolate band widest above tips of pectorals, reaching the vanishing point above the eye and below the tip of the dorsal; a golden band from upper part of eye to upper caudal lobe, continued forward of eye as a red streak; a dark brown lateral band from tip of jaws to tip of lower caudal lobe; a horizontal streak below the eye. Some scales below the lateral band with a brown spot; two oblique, black cross-bands, one up and back from last half of pectorals, the other up from before anal. Lower caudal lobe black; base of upper caudal lobe and of anal red; anal blackish. Fins otherwise hyaline.

***Pæcilobrycon erythrurus* sp. nov.**

Type, 33 mm. (No. 1168 Carnegie Museum Catalog of Fishes.) Rockstone sandbank.

Cotypes, 7 specimens, 33-37 mm. Rockstone sandbank. (C. M. Cat. No. 1168, *a, b*; I. U. Cat. No. 11693.)

Cotypes, 4 specimens, 22-27 mm. Gluck Island. (C. M. Cat. No. 1170, *a*; I. U. Cat. No. 11694.)

Cotype, 1 specimen, 22 mm. Amatuk. (C. M. Cat. No. 1187, *a*.)

Cotypes, 2 specimens, 32-33 mm. Rupununi Pan. (C. M. Cat. No. 1188, *a*; I. U. Cat. No. 11695.)



Allied to *P. marginatus* and *P. trifasciatus*.

Head 3.75; depth 4.66-4.75; D. 10; A. 9 or 10; scales 5 between D. and V., 10 before D., 26 in a median line. Eye equal to snout and to interorbital, 3.2 in the head; jaws equal.

Dorsal over the vertical from the ventrals; pectorals reaching half way to middle of ventrals; ventrals half way to middle of anal; adipose fin a little anterior to the tip of the last anal ray; origin of anal on a vertical from the tip of the last dorsal ray.

Back light brown margined by a more or less faint darker line; streak from snout through top of iris to upper half of middle of caudal light; a conspicuous lateral black band from mandible to base of lower caudal lobe, continued on the rays just below the middle; a dark streak from behind the base of the lower pectoral rays to and along base of the anal; middle anal rays dusky. Ventral surface silvery.

In life a blood-red streak borders the superior margin of the black lateral band over middle of the pectorals; a red spot on basal half of the dorsal, two red spots on base of the caudal, one similar spot on the anal lobe; an orange spot on each ventral fin.

***Pæcilobrycon ocellatus* sp. nov.**

Type, 41 mm. (No. 1179 Carnegie Museum Catalog of Fishes.) Wismar.

Cotypes, 2 specimens, 39, 41 mm. Wismar. (I. U. Cat. No. 11703.)

Cotypes, 71 specimens, 35-43 mm. Rockstone sandbank. (C. M. Cat. No. 1181, *a-j*; I. U. Cat. No. 11704.)

Cotypes, 9 specimens, 33-42 mm. Gluck Island. (C. M. Cat. No. 1181, *a-c*; I. U. Cat. No. 11705.)

Cotypes, 8 specimens, 31.5-37 mm. Rupununi Pan. (C. M. Cat. No. 118, *a-c*; I. U. Cat. No. 11706.)

Cotype, 1 specimen, 39 mm. Crab Falls. (C. M. Cat. No. 1183, *a*.)

Cotypes, 2 specimens, 39, 42 mm. Tumatumari. (C. M. Cat. No. 1184, *a*; I. U. Cat. No. 11707.)

Cotypes, 18 specimens, 31-43 mm. Konawaruk. (C. M. Cat. No. 1185, *a-e*; I. U. Cat. No. 11708.)

Most nearly related to *P. unifasciatus* Steindachner.

Head 4.2-4.4; depth 5.4-5.5; D. 10; A. 10 or 11; scales 5 between D. and V., 10 before D., 28 along a lateral series. Eye a little

shorter than snout, 3.3 in the head, equal to the interorbital. Upper jaw projecting.

Dorsal inserted slightly behind the vertical from the insertion of the ventrals; pectorals reaching half way to second third of ventrals; ventrals half way to base of last anal ray; adipose fin over middle of last anal ray.

Light brown above, bordered below by a black band from tip of snout and mandible to the end of the lower caudal lobe; the band is widest on the caudal peduncle where it unites with its fellow of the other side; a bar connects the two lateral bands in front of the anal. Lower parts silvery-white. Dorsal hyaline; lower caudal lobe black, obliquely crossed near the center by a red band, and margined with red above; usually a black, ocellus-like spot or streak near the middle of the caudal rays near the center of the fin; middle, and sometimes the posterior anal rays, dark. Opercle purple.

**Archicheir** gen. nov.

This genus is a *Nannostomus* with peculiar pectorals. In *Nannostomus* the pectorals are normal, as in related genera; in this genus they appear to have retained the embryonic structure. They are broad, dermal flaps, with hair-like fringes.

Gill-membranes united, free from the isthmus.

**Archicheir minutus** sp. nov.

Type unique, 26 mm. (No. 1186, Carnegie Museum Catalog of Fishes.) Canal at Christianburg.

This species is readily recognizable by the color of the caudal and anal fins.

Head 3.5; depth 5.66; D. 9; A. 11; scales large. Eye 3.5 in the head, considerably greater than the interorbital, but little shorter than the snout.

Origin of dorsal a little posterior to origin of ventrals.

Adipose fin considerably behind tip of the anal.

Back chocolate. A light band from end of snout to base of superior caudal lobe; a dark band from end of maxillary to the base of the inferior caudal lobe. A black spot at base of the pectoral and one before the first ventral ray. Dorsal dusky; adipose black. Middle caudal rays black; an oblique bar from the edge of base of each lobe to the end of the median black bar, the lowermost one much the

widest, the superior bar brown, shading into black at both ends. Anal hyaline, a black bar across tips of the last rays.

Subfamily SERRASALMINÆ.

Genus PYGOCENTRUS Müller & Troschel.

**Pygocentrus bilineatus** sp. nov.

Type, 102 mm. (No. 1072 Carnegie Museum Catalog of Fishes.) Aruka River.

Cotypes, 95 and 110 mm. Aruka River. (C. M. Cat. No. 1073; I. U. Cat. No. 11756.)

Cotypes, 2 specimens, 43 and 56<sup>17</sup> mm. Creek in Moro Passage. (C. M. Cat. No. 1074; I. U. Cat. No. 11757.)

This species can best be described by means of a "Key" to the species so far recorded in British Guiana.

*a.* Abdominal serræ 40; depth  $1\frac{5}{7}$ ; D. 18; A. 33-35; lat. l. 105; interorbital a little less than half the length of the head; second suborbital in contact with the preopercle. *niger.*

*aa.* Abdominal serræ less than 35.

*b.* Depth about 2 in the length; head heavy, about 3 in the length; D. 17-18; A. 30-33; lat. l. 95-100; snout short; abdominal serræ 24, very blunt; interorbital nearly half the length of the head; a very narrow naked area on the cheek; origin of dorsal nearly equidistant from base of middle caudal rays and front of eye; sides profusely spotted; a V-shaped black bar on the base of the caudal; margin of caudal dark; adipose fin rayed in the adult. *piraya.*

*bb.* Depth 1.5-1.75; head 3.12-3.5; D. 15 or 16; A. 32-34; lat. l. 90; abdominal serræ 27-33; snout short, blunt, 4.33 in the head; eye 3.5-4; interorbital 2.33; a narrow lens-shaped naked area on the cheek, not more than one-fourth as wide as the second interorbital; origin of dorsal about equidistant from base of middle caudal rays and front of eye. Gillrakers minute, about 15 on the lower limb; a large diffuse humeral blotch; sides with numerous small spots; caudal in the adult with a narrow hyaline margin, the rest of the fin black; in the young hyaline, with a faint basal V-shaped bar. *scapularis.*

*bbb.* Depth  $1\frac{3}{7}$ ; head 3.33; D. 15 or 16; A. 30-33; abdominal serræ 30 or 31; lateral line 73-76; snout pointed, equal to the eye, 3.5 in the head; interorbital 2.5 in the head; a lens-shaped naked area on the angle of the preopercle nearly half as high as the second suborbital; origin of dorsal but little nearer base of caudal than tip of snout; about 8 minute gillrakers on the lower arch; a prominent humeral spot; sides obscurely spotted, margin of caudal and a V-shaped basal band black; scales along

<sup>17</sup> This specimen seems to have teeth on the palate, depth 1.75; D. 15; A. 33; serræ 30.

base of anal and anal margin black; base of anal white; dorsal and adipose blackish. *bilineatus*.

### Order HAPLOMI.

#### *PÆCILIIDÆ*.

##### GENERA OF PÆCILIIDÆ OF GUIANA.

- a.* Males similar to the females except in color; oviparous; dorsal over the anal; eyes normal; teeth conical, in several series; body subcylindrical.

*Rivulus* Poey.

- aa.* Anal of the male modified; viviparous.

- b.* Eyes elevated, the upper part adjusted to see in the air, the lower in the water; dorsal behind the anal in both sexes. *Anableps* Linnæus.

- bb.* Eyes normal.

- c.* Caudal peduncle without a knife-like edge below; anal fin of the male on the lower surface of the abdomen.

- d.* Intromittent organ not spine-bearing, composed of simply modified anal rays; males at least as large as the females.

*Pæcilia* Bloch and Schneider.

- dd.* Intromittent organ with many retrorse spines in front and behind; males highly ornamented and much smaller than the females.

*Acanthophaelus* Eigenmann.

- cc.* Caudal peduncle with a knife-like ridge below; intromittent organ very long, placed under the pectoral, the ventrals of the male under the gill opening; teeth conical, in a few series. Slender, hyaline.

*Tomeurus* Eigenmann.

#### Genus RIVULUS Poey.

The new species of *Rivulus* of British Guiana are best definable by the following key:

- a.* Sides without longitudinal markings except a dark band from tip of lower jaw continued as a darker shade of the general color of the side; head 4; depth  $4\frac{3}{4}$ ; D. 9 or 10; A. 12; scales 35 counting to the last one on the caudal; 20-23 scales in front of the dorsal; eye 3.5, greater than snout; 1.6 in inter-orbital; occipital scales as large as the two bordering it on its sides; caudal broad, subtruncated or rounded, with angular corners above and below; sides dusky, centers of the scales of the back darker; middle of caudal with about 5 cross-bars; ventrals margined with dark; dorsal and anal dark; origin of anal equidistant from base of middle caudal rays and upper angle of gill opening.

*breviceps*.

- aa.* Sides with longitudinal markings.

- b.* Anal 14-17.

- c.* Head 4-4.5; depth 5; D. 9 or 10; A. 15-17; scales 43 plus 4 on the base of the caudal rays; eye 3.5 in head, equal to snout, 1.6 in inter-orbital; occipital scale very narrow; caudal broadly rounded; origin of anal equidistant from base of middle caudal rays and upper angle of gill openings; about 30 scales in front of the dorsal; female with a

black spot on the upper part of the caudal peduncle; anterior parts of the male with numerous longitudinal lines; middle series of scales on caudal peduncle and second series above and below this with series of conspicuous spots; similar spots irregularly placed on other scales of the caudal peduncle and forward in the male; dorsal and caudal and in less degree the anal profusely spotted in the female; less so in the male; ventrals and anal margined. *holmiae*.

cc. Head 4.66-5; depth 5.5-6; D. 8; A. 14-16; scales 46-52 plus several on the base of the caudal rays; about 33 scales in front of dorsal; eye 3.75 in the head, 2 in the interorbital; sides in male with alternating light and dark stripes, the middle line of the sides light, bordered with rather wider dark bands, which have lighter spots or streaks in the center, above and below these alternating light and dark stripes; sides in female with a median dark stripe, a second one some distance below it and another above it, all much heavier on the caudal peduncle where the lower of the three becomes especially heavy; ventrals and anal margined; caudal spotted near base in the female. *waimacui*.

bb. Anal 11-13; head 4.5; depth 5.5.

d. Scales 42 or 43; D. 6 or 7; A. 11-12; caudal broadly rounded; origin of anal equidistant from base of middle caudal rays and upper angle of gill-openings; base of the anal equals the head or head less snout; about 30 scales before the dorsal; female with a faint black spot on upper part of caudal peduncle; sides of the females with a dark spot on the center of each scale; sides of the males with a dark spot on the center of each scale and dark stripes between the rows of scales especially noticeable on the flank, the dark spots becoming obscure at times with the increase in intensity of the stripes; ventrals pale; caudal cross spotted; spots of the upper part of the sides olive-green, those of the lower rusty. *stagnatus*.

dd. Scales 42 plus several on the base of the caudal peduncle. D. 7; A. 13; caudal pointed, lanceolate, with cross-bands between the rays; origin of the anal equidistant from the base of the middle caudal rays and the second scale behind the upper margin of the pectoral; base of anal equals head less opercle; about 3 scales before the dorsal. *lanceolatus*.

### **Rivulus breviceps** sp. nov.

Type, 50 mm. (No. 1075 Carnegie Museum Catalog of Fishes.) Shrimp Creek.

Cotypes, 4 specimens, 50, 35, 32, and 18 mm. respectively, at least the two larger, males. Shrimp Creek where the path from Tukeit to the head of the Kaieteur crosses it. (C. M. Cat. No. 1515; I. U. Cat. No. 11758.)

Distinguished by its short head, few scales and absence of longitudinal markings. This species was taken with *R. waimacui*.

**Rivulus holmiæ** sp. nov.

Type, a female, 77 mm. (No. 1076 Carnegie Museum Catalog of Fishes.) Holmia.

Cotypes, 4 females, 38–77 mm.; and 13 males, 48–70 mm. (C. M. Cat. No. 1077; I. U. Cat. No. 11759.)

Creeks about Holmia.

Rather abundant under the rocks of a small rivulet behind the Company's House at Holmia. My attention was first called to it by two Indian girls who caught several specimens for me while bathing.

Belly in life yellow, spots in the smaller specimens rusty, sides bluish; dorsal and anal red, margined with olive. Spots in the female dark brown, sides olive.

It is interesting to note that the females have the distinguishing caudal spot and are otherwise more brilliantly marked than the males.

**Rivulus waimacui** sp. nov.

(*Waimacui* of the Indians.)

Type, a female, 79 mm. (No. 1078 Carnegie Museum Catalog of Fishes.) Shrimp Creek.

Cotypes, 5 males, 57–88 mm.; 7 females, 41–88 mm. Shrimp Creek. (C. M. Cat. No. 1079; I. U. Cat. No. 11760.)

Cotype, 1 specimen, 25 mm. Amatuk. (C. M. Cat. No. 1080.)

Cotype, 1 specimen, 41 mm. Waratuk. (C. M. Cat. No. 1081.)

Rather abundant in Shrimp Creek (*Orimetuk* of the Indians, near the Kaieteur). At the time of my visit the water was confined to cracks in the long rocky steps forming the bed of this creek.

*Female*. — Upper surface olive. Sides cobalt-blue shading to sky-blue below, alternating with stripes of bright red; dorsal and caudal margined with light greenish-blue somewhat rusty on lower edge; darker part of dorsal and caudal purple; anal very pale blue with rusty spots at base, then rusty, margined as well as ventrals with dark purple. Entire ventral surface salmon to orange; pectorals geranium-red to orange; ventrals except at margin like belly. Chin and lips purplish.

*Male*. — Has caudal purplish-red, and anal yellowish with purple spots, belly white; back and sides olive-purplish with stripes of dark purple.

**Rivulus stagnatus** sp. nov.

Type, a female, 44 mm. (No. 1082 Carnegie Museum Catalog of Fishes.) Christianburg.

Cotypes, 13 males, the larger 41 mm. ; 6 females, the largest 46 mm. Christianburg. (C. M. Cat. No. 1083, *a-d*; I. U. Cat. No. 11761.)

Abundant in little pools just below the saw-mill at Christianburg. Several specimens probably belonging to this species were sent me from Kumaka on the Demarara above Wismar.

Caudal spots always along the rays, rarely confluent into zigzag cross-bars, anal plain or spotted, dorsal spotted.

**Rivulus lanceolatus** sp. nov.

Type unique, 42.5 mm. long. (No. 1084 Carnegie Museum Catalog of Fishes.) Rockstone.

**Rivulus frenatus** sp. nov.

Type unique, 28 mm. (No. 1085 Carnegie Museum Catalog of Fishes.) Gluck Island.

Genus ACANTHOPHACELUS Eigenmann.

GUIANA SPECIES OF ACANTHOPHACELUS.

- a.* Male with a bright silvery lateral band bordered above and below by black; females with wavy brown lines between the scales on the flanks. *melanzonus*.
- aa.* Male with two to four spots of varying size and variously placed along the sides, very variable; female with reticulated sides, unspotted. *reticulatus*.<sup>18</sup>
- aaa.* Male with a black caudal spot usually prolonged along the dorsal and ventral margins; both male and female with a dark band on the upper part of the sides about 6 scales behind the head. *bifurcus*.

**Acanthophaelus melanzonus** sp. nov.

Type, a male, 27 mm. (No. 1086 Carnegie Museum Catalog of Fishes.) Georgetown Trenches.

Cotypes, several females, the longest 39 mm. Georgetown Trenches. (C. M. Cat. No. 1087, *a-e*; I. U. Cat. No. 11762.)

Head 4 + ; depth  $3\frac{2}{3}$ -4; D. 6; A. 9; scales 27 to base of caudal; eye 3 in head, 3 in interorbital; depth of caudal peduncle  $6\frac{1}{2}$  in the

<sup>18</sup> ACANTHOPHACELUS RETICULATUS (Peters).

This is the most abundant of the Pœciliids found in the Georgetown trenches. I am not able to distinguish it from the "millions" of Barbados. The three species of *Acanthophaelus* together with *Pœcilia vivipara* Bloch & Schneider are the only species in the Georgetown trenches. The latter is the largest of the Pœciliids in the Georgetown trenches and can readily be distinguished by its inconspicuous alternating bands of lighter and darker. The sides between the dorsal and pectoral of the female frequently have a dark spot surrounded by silvery; the upper and lower margins of the tail in the largest males is black.

length; 14-16 scales in front of the dorsal; distance of origin of dorsal equal to eleven scales in front of the dorsal; end of anal and origin of dorsal equidistant from base of middle caudal rays; ventrals in the female barely reaching anal; pectorals beyond origin of ventrals.

Female with wavy longitudinal dark stripes on the flanks between the rows of scales merging into brown edged scales on the sides above the anal, sometimes a row of spots between the stripes, one on the margin of each scale; lower surfaces colorless, back quite dark brown; scales above the pectoral, between the two lower stripes, silvery white.

Male with a silvery band from the eye to the caudal where it is bent upward, bordered above and below on the sides by black stripes also bent up and confluent, but faint on the caudal; belly colorless; scales of the back margined with dark, those along the lower side of the caudal peduncle with fainter margins.

Fins unspotted in both sexes.

***Acanthophaelus bifurcus* sp. nov.**

Type, a male, 22 mm. (No. 1088 Carnegie Museum Catalog of Fishes.) Christianburg.

Cotypes, 24 ♀, the largest 29 mm. Small pond at Christianburg. (C. M. C. No. 1089, *a-e*; I. U. Cat. No. 11763.)

Cotypes, 13 ♂, the largest 24 mm. Small pond at Christianburg. (C. M. C. No. 1090, *a-e*; I. U. Cat. No. 11764.)

Cotypes, 29 ♀, the largest 25 mm. Small creek at Wismar. (C. M. C. No. 1091, *a-e*; I. U. Cat. No. 11765.)

Cotypes, 8 ♂, the largest 24 mm. Small creek at Wismar. (C. M. C. No. 1092, *a-b*; I. U. Cat. No. 11766.)

Some of the females but 20 mm. long are with young.

Head 3.33-3.75; depth at origin of anal 4.5; depth of caudal peduncle 5.5; D. 7; A. 8; scales 26 or 27 to base of caudal; eye 2.5 in the head, 1.33 in interorbital; 14 scales in front of the dorsal.

Slender, much more so than *vivipara*; origin of dorsal about equidistant from base of middle caudal rays and occiput; end of anal below the vertical from the origin of dorsal; ventrals in the female reaching slightly beyond origin of anal; pectorals to the ventrals.

Females with a dark vertical spot on the upper part of the sides about six scales behind the head, margined with lighter; dark borders of the scales of the sides forming a regular reticulation; a black median line behind the anal; base and tip of dorsal blackest, all the other fins hyaline.



Male with the general color of the female, the dorsal nearly black ; caudal with a variously shaped dark olive-green vertical band at its base, usually continued into a long prong along the entire upper margin of the fin, very frequently continued into a shorter prong along the ventral edge of the fin ; the basal bar sometimes diffused over the entire caudal peduncle ; anal with some black.

In life sides of male yellowish, caudal peduncle pokeberry-red to dark olive-green ; upper caudal prong bordered by pokeberry-red below, or rusty ; one male with a black streak and a milk-white margin to the anal.

**Tomeurus** gen. nov.

Teeth conical, in about three series ; dorsal placed far back over the last fourth of the body ; anal in the female in advance of the middle of the body, in the male moved forward to below the origin of the pectorals ; ventrals not evident in the female, minute, under the upper angle of the gill-opening in the male ; pectorals large ; alimentary canal much shorter than the body ; caudal peduncle with a ventral knife-like ridge extending almost its entire length, resembling an adipose fin, but composed of about sixteen paired scales ; intromittent organ of the male very long, composed of the first three anal rays, the first divided into two lateral prongs near the tip, each of which has a backward projecting process near its middle and a slender spine-bearing appendage near its base, a similar but larger spine-bearing appendage between the bases of the prongs.

**Tomeurus gracilis** sp. nov.

Type, 31 mm. (No. 1093 Carnegie Museum Catalog of Fishes.)

Cotypes, 3 ♂, 29–30 mm. Mud Creek in Aruka River.

Cotypes, 3 ♀, about 20, 24 and 28 mm. Mud Creek in Aruka River. (C. M. Cat. No. 1094 ; I. U. Cat. No. 11767.)

Cotypes, 1 ♀, 18 mm. Wismar. (C. M. Cat. No. 1095.)

This species represents the type of a new subfamily of Pœciliids.

Head 5.5 ; depth 6.5 ; D. 6 ; A. 6 ; scales 39 from occiput to tail ; 7 between the middorsal scale and the ventral ridge ; 26 scales in front of the dorsal ; eye longer than snout,  $2\frac{3}{4}$  in head, a little less than the interorbital.

Very long and slender, mouth rather large, vertical, its width equal to the diameter of the eye ; origin of dorsal near beginning of the third fourth of the length, its height equals length of head less oper-

cle ; caudal rather pointed  $3\frac{1}{2}$  in the length ; origin of anal a little in advance of the middle small ; intromittent organ of the male  $\frac{1}{3}$  of the length, its origin a little in advance of the vertical from the base of the pectoral, extending to the ventral ridge ; pectorals equal to their distance from the snout.

Hyaline ; a black line from the upper edge of the base of the pectoral to the middle of the caudal ; a broader black line along base of ventral ridge , a few specks below the lateral black line ; the scales of the sides above it with a marginal row of chromatophores ; scales of back frequently with one or more additional chromatophores of which a median one is most prominent ; upper part of head and area in front of pectorals dotted.

II. REPORTS ON THE EXPEDITION TO BRITISH  
GUIANA OF THE INDIANA UNIVERSITY  
AND THE CARNEGIE MUSEUM, 1908.

REPORT No. 2.

A NEW GENUS AND TWELVE NEW SPECIES OF TETRAGONOPTERID CHARACINS.<sup>1</sup>

BY MARION LEE DURBIN.<sup>2</sup>

**Dermatocheir** gen. nov.

This genus differs from its nearest relative *Hyphessobrycon* in having an archaic pectoral like *Archicheir*. The pectoral consists of a fleshy lobe, surrounded by a fringe of filaments. Inasmuch as the other fins are well developed, and specimens of other species smaller than the one described have the pectoral normal, the peculiarity cannot be ascribed to extreme youth. It may of course be an abnormal specimen.

Type, *Dermatocheir catablepta* sp. nov.

**Dermatocheir catablepta** sp. nov.

Type unique, 18 mm. (No. 1198 Carnegie Museum Catalog Fishes.) Tumatumari, above the falls.

Head 3.5, depth 3.8; D. 11, A. 20; scales 5-33-3, eye 2.5 in the head; interorbitals very slightly greater than the eye, 2.2 in the head.

<sup>1</sup> In the ditches, among weeds in canals and in the small woodland streams of the lowlands of British Guiana occur large numbers of small Tetragonopterid characins with an incomplete lateral line. That no attention has been paid to these fishes by previous collectors is shown by the fact that out of a total of sixteen species, thirteen are new, and the other three had not been recorded from the Guianas. The genera with an incomplete lateral line had until recently been united with the conglomerate genus *Tetragonopterus*. They are closely allied to *Astyanax* and *Moenkhausia*. The species of *Pristella* have teeth along the entire edge of the maxillary. The new species of this genus is described in No. 1 of these reports. *Dermatocheir* has an archaic pectoral fin and may be an abnormal specimen. *Hemigrammus* has a scaled caudal and *Hyphessobrycon* has the caudal naked, characters of but little significance.

C. H. Eigenmann.

<sup>2</sup> Contributions from the Zoölogical Laboratory of Indiana University, No. 102.

Compressed, head at the base of the occipital process very nearly equal to the greatest depth. Preventral region rounded, scaled, but without complete series of median scales. Postventral region narrow. Predorsal region rounded.

Occipital process short, interorbitals flat, frontal fontanel triangular, narrower than the parietal, slightly longer than the parietal without the occipital groove. Second suborbital leaving a narrow naked margin behind and below. Snout short, about half the length of the eye. Mouth moderately large, lower jaw protruding beyond the upper when the mouth is open. Maxillary  $\frac{4}{5}$  the eye; mandible equal to the eye. Premaxillary with five small conical teeth in the outer row and five tricuspid teeth in the inner row. Maxillary with seven small conical teeth closely packed together. Dentary with a series of four rather broad tricuspid teeth, probably followed by several minute ones on the sides.

Scales cycloid, regularly imbricate, with striæ few (2-3); no interpolated scales or rows of scales. Caudal naked. Anal sheath reduced to a single small scale, not extended upon the first anal rays. Pores developed on the first nine scales of the lateral line, the rest of the scales in the series with a shallow notch on the free margin. The series just below the slightly decurved lateral line parallel to it.

Origin of the dorsal equidistant from the snout and caudal, penultimate ray  $\frac{2}{3}$  of the longest which is 3.2 into the length. Caudal not so long as the head. Origin of the anal on the vertical from the second scale behind the dorsal. Anal emarginate, the longest ray about  $1\frac{1}{3}$  into the length of the base. Ventrals on the vertical from the first dorsal ray. Ventrals just reaching the anal. Pectorals short and paddle-shaped with a fringe of soft rays.

Humeral spot vertically elongate, very faint. No caudal spot, but a few chromatophores at the base of each caudal lobe. Lateral stripe very dim. Scales of the back outlined with dusky. Fins without pigment.

Genus HEMIGRAMMUS Gill.

**Hemigrammus erythrozonus** sp. nov.

Type, 32 mm. (No. 1448 Carnegie Museum Catalog Fishes.) Erukin.

Cotypes, 32 specimens, 21-33 mm. Erukin. (C. M. Cat. Fishes No. 1449, *a-e*; I. U. Cat. No. 11905.)

Distinguished by having along the sides a cherry-colored streak,

which is continued upon the base of the caudal; and a streak from above the anterior ten anal rays to the mandible without black chromatophores. No humeral spot; sometimes a small dark spot at the base of each caudal lobe. Teeth mostly three- to five-pointed.

Head 3.75, depth 3.33 to 3.75; D. 11, A. 20-22; scales 5-31 to 34-3 to 3.5; eye 2.5 in the head; snout  $\frac{2}{3}$  of eye. Interorbitals less than eye about 2.75 in head.

Compressed, head at base of the occipital process  $\frac{2}{3}$  of the greatest depth. Preventral region rounded, without complete regular series of median scales. Postventral region narrow. Predorsal region rounded, median series of scales incomplete, always more or less irregular near the head.

Occipital process from one-sixth to one-seventh of the distance from its base to the dorsal, bordered by three scales. Interorbitals convex. Frontal fontanel much narrower than parietal, triangular, two-thirds of the parietals without the occipital groove. Second suborbital leaving a narrow naked margin behind and below. Snout short; mouth moderately large. Lower jaw included when the mouth is closed. Maxillary  $\frac{3}{4}$  of the eye. Mandible equal to the eye, 2.5 in head, much weaker than the upper jaw. Naked area of cheek  $\frac{1}{4}$  the eye in width. Premaxillary with five three- to five-pointed teeth in the inner row and two or three narrow tricuspid teeth in the outer row. Maxillary with two to four, three- to five-pointed teeth. Dentary with four or five, five- to seven-pointed teeth in a graduated series followed by seven or eight minute tricuspid and conical teeth on the sides.

Gillrakers 8 + 6.

Scales cycloid, regularly imbricate, striæ few, variable in number (2 to 7); no interpolated scales or rows of scales. Anal sheath short, of three scales covering the bases of the first five anal rays. Caudal scaled over the basal fourth. Lateral line with pores on six to nine scales. Very slightly decurved.

Origin of dorsal equidistant from the snout and caudal, penultimate ray one-third the longest, which is  $3\frac{2}{3}$  into the length. Origin of the anal on the vertical from the last dorsal ray. Anal deeply emarginate, longest ray four-fifths as long as the base. Caudal equal to the length of the head. Ventrals on the vertical from the second scale in front of the dorsal. Ventrals just reaching the first or second anal rays. Pectorals reaching the first scale in front of ventrals.

No true humeral spot; pores and margins of the first three or four

scales in the lateral line heavily outlined with dusky and a group of large chromatophores just behind the eye on the head give the appearance of a humeral spot. Web of distal half of dorsal, almost all of the caudal, all of the ventrals, pectorals, and the web between the first seven anal rays dusky. Often a faint little dark spot at the base of each caudal lobe, no true caudal spot. Scales of the back and upper one-third of the sides outlined with dusky. A broad stripe extending from the head to the caudal and half way to the end of the middle caudal rays without chromatophores, cherry-red in life. Below this lateral stripe a dusky stripe two scales in width extends the length of the body. The belly and a streak on the sides from just above the bases of the anterior ten anal rays to the mandible without chromatophores. Bases of the anal and under side of the caudal peduncle black to dusky. Lips dusky. Dorsal lobe and upper part of the iris cherry-red in life.

**Hemigrammus rodwayi** sp. nov.

Type, 46 mm. (No. 1450 Carnegie Museum Catalog of Fishes.) Georgetown trenches.

Cotypes, 183 specimens, 38–49 mm. Georgetown trenches. (C. M. Cat. No. 1451, *a-z*; I. U. Cat. No. 11906.)

Cotypes, 112 specimens, 28–53 mm. Botanic Garden. (C. M. Cat. No. 1452, *a-z*; I. U. Cat. No. 11907.)

Cotypes, 4 specimens, 24–26 mm. Mud Creek in Aruka. (C. M. Cat. No. 1453, *a-b*; I. U. Cat. No. 11908.)

Cotypes, 7 specimens, 34–40 mm. Creek in Barima River. (C. M. Cat. No. 1454, *a-b*; I. U. Cat. No. 11909.)

Distinguished from *H. matei* by not having the iridescent spot on the caudal peduncle. Fins without definite black markings, sometimes dusky. Caudal spot well extended upon the caudal rays. A bright cherry-red spot at the base of each caudal lobe in living males; this same color is very often found on the base of the dorsal and anal. The red is replaced in females with yellow.

Head 4, depth 2.75–3, D 11, A 22–24; scales 5–32 to 34–2 $\frac{1}{2}$  to 3 $\frac{1}{2}$ ; eye 2–2 $\frac{1}{3}$  in the head; snout  $\frac{2}{3}$  of the eye, interorbitals very nearly equal to the eye, 2.4 to 2.5 in the head.

Compressed, head at the base of occipital process  $\frac{2}{3}$  to  $\frac{5}{6}$  of the greatest depth. Preventral region rounded without complete series of median scales. Postventral region narrow. Predorsal region

rounded, sometimes with complete series of nine or ten median scales.

Occipital process one-sixth of the distance from its base to the dorsal, bordered by three scales. Interorbital convex. Frontal fontanel narrower than the parietals, triangular, and almost as long as the parietals without the occipital groove. Second suborbital without naked margins. Snout short, mouth moderately large, lower jaw included only when the mouth is closed. Maxillary not quite equal to the eye. Mandible a little longer than the eye, 2-2.4 in the head. Preopercle not deeply incised above. Premaxillary with four or five four- or five-pointed teeth in the inner and three or four tricuspid teeth in the outer row. Maxillary with two or four small conical or three-pointed teeth. Dentary with a graduated series of four five- to seven-pointed teeth, and several minute conical teeth on the sides.

Gillrakers 10 + 6.

Scales cycloid, regularly imbricate, no interpolated scales or rows of scales, striæ (about ten) variable in number, some scales of the predorsal region being probably lacking in some specimens. Caudal much scaled. Anal sheath of about five scales covering the bases of the first six to eight anal rays. Axillary scale developed. Lateral line with pores on nine to twelve sometimes fifteen scales, lightly decurved.

Origin of the dorsal equidistant from snout and caudal, penultimate ray one-third of the longest, which is  $3\frac{1}{2}$  into the length. Origin of the anal on the vertical from the first or second scale behind the dorsal. Anal deeply emarginate; longest ray  $\frac{2}{3}$ - $\frac{3}{4}$  of the length of the base. Caudal half the length of the eye longer than the head, much scaled, ventral lobe slightly larger than the dorsal lobe. Ventrals on the vertical from the first scale in front of the dorsal, just reaching the anal. Pectorals either not quite or just reaching the ventrals

No shoulder spot. A silvery lateral stripe extending from the caudal to about the vertical from the first dorsal rays, and continued forward by a few large scattered chromatophores. The black caudal spot usually extending nearly or entirely to the end of the middle caudal rays. Scales of the back and sides above the lateral stripe outlined with pigment, an olive stripe along the back, sides above stripe straw-colored, scales below the stripe with a light blue iridescence. All fins somewhat dusky. Males with a cherry-red spot on the base of each caudal lobe, anterior anal margin with a white bar broadest

towards the tip, the rest of anal and the base of dorsal tinged with red. Females with yellow on caudal, anal, and dorsal in place of the red described in the case of males. The white bar on anal lacking in females.

**Hemigrammus iota** sp. nov.

Type, 18 mm. (No. 1458 Carnegie Museum Catalog of Fishes.) Gluck Island.

Cotypes, 4 specimens, 19–21 mm. Rockstone. (C. M. Cat. No. 1460, *a*; I. U. Cat. No. 11914.)

Cotypes, 7 specimens, 18–21 mm. Gluck Island. (C. M. Cat. No. 1459, *a-b*; I. U. Cat. No. 11913.)

Distinguished by vertically elongate black humeral spot, a black I-shaped bar on the caudal peduncle not continued on the caudal rays and not continuous with the narrow blackish lateral stripe. Maxillary with two, four- or five-pointed teeth.

Head 3.6, depth 3.4; D. 11, A. 15–17; scales 5–30–3; eye  $2\frac{1}{3}$ –2.5; snout  $\frac{3}{5}$  of the eye. Interorbitals slightly less than the eye, 2.8 in the head.

Compressed, head at the base of occipital process  $\frac{3}{4}$  of the greatest depth. Preventral region rounded, usually without complete series of median scales. Postventral region narrow. Predorsal region rounded, usually with complete series of nine to eleven median scales.

Occipital process one-seventh to one-eighth of the distance from its base to the dorsal bordered by two scales on each side. Interorbitals convex. Frontal fontane much narrower than the parietal, triangular, three-fourths of the parietals without the occipital groove. Second suborbital covering the entire cheek. Snout short, mouth comparatively large; lower jaw included only when the mouth is closed. Maxillary .7 of the eye. Mandible a little longer than the eye, 2 + in the head. Premaxillary with five, three- to five-pointed teeth in the inner row, and two or three narrow tricuspid teeth in the outer row. Maxillary with one or two broad teeth with four or five points. Dentary with a graduated series of four or five large five-pointed teeth followed by four or five minute conical teeth on the side.

Gillrakers about 9 + 7.

Scales cycloid, regularly imbricate, striæ few (5–7) variable in number; no interpolated scales or rows of scales. Anal sheath short, composed of seven scales, covering the base of the first eight or nine anal rays. Caudal scaled. Lateral line with pores on the first six to eight scales. Lateral line very slightly decurved.



Origin of dorsal less than half the length of the eye nearer the caudal than the snout. Penultimate ray two-fifths of the longest, which is three and one-fifth into the length. Origin of the anal on the vertical from the first to third scale behind the dorsal. Anal deeply emarginate, the longest ray almost equal to the base. Caudal a very little longer than the head. Ventrals on the vertical from the second or third scale in front of the dorsal. Ventrals just reaching the anal, pectorals just barely reaching the ventrals, or more often reaching to the second or third scale in front of the ventrals.

Humeral spot conspicuous, black, vertically elongate, surrounded by a small light area. Caudal spot variable in intensity, not continued upon the caudal rays, and not continuous with the narrow black lateral stripe, which is overlaid with silvery. Scales of the postdorsal region each marked with a round dark spot in addition to a few scattered chromatophores. Scales of the predorsal region with less distinct round spots and a generally more pronounced dusky shading. Scales of the sides above the lateral stripe outlined with dusky. A few chromatophores scattered over the region between the anal and the lateral stripe. There are some indications of a very faint secondary humeral spot. All fins somewhat dusky. Caudal with an orange spot on the base of each lobe (evident in living specimens only).

***Hemigrammus orthus* sp. nov.**

Type, 28 mm. (No. 1477 Carnegie Museum Catalog Fishes.) Tukeit.

Cotypes, 17 specimens, 22–30 mm. Tukeit. (C. M. Cat. No. 1478, *a-f*; I. U. Cat. No. 11912.)

Cotypes, 25 specimens, 14–21 mm. Gluck Island. (C. M. Cat. No. 1479, *a-f*; I. U. Cat. No. 11922.)

Cotype, 1 specimen, 27 mm. Essequibo below Packeoo. (C. M. Cat. No. 1480.)

Distinguished by a diffuse humeral spot, and a black lateral stripe. A black line at the base of the last anal rays, separate from that at the base of the first seven. Dorsal, caudal, and first seven rays of the anal dusky. No caudal spot. Maxillary equal to the eye.

Head 3.75, depth 3.75; D. 11, A. 19 to 22; scales 5–30 to 33–3; eye 2.5 in the head; interorbital not quite equal to the eye, about 3 in the head.

Compressed, head at the base of the occipital process about three-

fourths of the greatest depth. Preventral region rounded, without complete series of median scales. Postventral region narrow. Predorsal region rounded, probably with a complete series of nine median scales.

Occipital process about one-sixth of the distance from its base to the dorsal, bordered by two or three scales on the sides. Interorbitals slightly convex. Frontal fontanel triangular, narrower than the parietals and not quite equal to the parietal without the occipital groove. Second suborbital leaving narrow naked margins behind and below. Snout a little more than one-half the length of the eye. Mouth large. Maxillary equal to the eye, narrow, slightly curved backwards, the two sides parallel to each other. Mandible equal to the maxillary. Premaxillary with three tricuspid or conical teeth in the outer row and five three- to five- or rarely seven-pointed teeth in the inner row. Maxillary with one to five tricuspid or conical teeth. Dentary with a graduated series of four or five large three- to five-pointed teeth.

Gillrakers 7 + 14.

Scales cycloid, regularly imbricate, no interpolated scales or rows of scales. Striæ few, variable in number. Caudal with three to five scales on the base of each lobe. Anal sheath short, of three scales covering the base of the first six anal rays. Lateral line with pores developed on about seven scales. Only slightly decurved.

Origin of the dorsal equidistant from the snout and caudal, penultimate ray one-third of the longest, which is 3.5 in the length. Origin of the anal on the vertical from last dorsal ray. Anal deeply emarginate; the longest ray about 0.8 of the base. Base of ventrals on the vertical from the second scale in front of the dorsal. Ventrals just reaching anal. Pectorals just reaching ventrals.

A diffuse round, or somewhat vertically elongate, humeral spot. A dark lateral stripe heaviest behind the origin of the anal, but not reaching the base of the caudal. No caudal spot. A black line at the base of the first anal rays not continuous with that at the base of the first seven. Dorsal, caudal, first seven rays of the anal, and first two or three rays of ventrals, dusky. Scales of the back dusky, each often bearing a single black spot.

***Hemigrammus cylindricus* sp. nov.**

Type, 57 mm. (No. 1461 Carnegie Museum Catalog of Fishes.)  
Tumatumari.

Cotypes, 6 specimens, 35–58 mm. Tumatumari. (C. M. Cat. No. 1462, *a*; I. U. Cat. No. 11915.)

Cotypes, 11 specimens, 46–54 mm. Crab Falls. (C. M. Cat. No. 1163, *a-c*; I. U. Cat. No. 11916.)

Cotypes, several specimens. Rockstone. (C. M. Cat. No. 1464, *a-e*; I. U. Cat. No. 11917.)

Cotype, 1 specimen, 45 mm. Gluck Island. (C. M. Cat. No. 1465, *a*.)

Distinguished by large eye, snout almost as long as the eye; mouth large, maxillary almost straight behind. Slender fishes with all fins hyaline. Humeral spot small, a black line at the base of the anal.

Head 3.3–3.66, depth 3.66–4.66; D. 11, A. 17 to 20; scales 5–30 to 34–3; eye large, slightly longer than wide, 2.75 in the head; interorbitals almost flat, almost equal to the eye, 3 in the head.

Compressed, head at the base of occipital process two-thirds to four-fifths the greatest depth. Preventral region rounded, without complete series of median scales. Postventral region narrow. Pre-dorsal region rounded with a complete median series of eight to twelve scales.

Occipital process about one-sixth of the distance from its base to the dorsal, bordered by two or three scales. Interorbital nearly flat. Frontal fontanel small, triangular, narrower than the parietal; two-thirds the length of the parietal without the occipital groove. Second suborbital leaving considerable naked margins behind and below. Maxillary straight, eight-tenths as long as the eye. Mandible a little longer than the eye, 2.5 in the head. Premaxillary with three or four tricuspid teeth in the outer row and six tricuspid teeth in the inner row. Maxillary with three to six tricuspid or occasionally conical teeth. Dentary with a graduated series of four or five teeth also tricuspid.

Gill rakers 6 + 9.

Scales cycloid, regularly imbricate, striæ few, variable in number; no interpolated scales nor rows of scales. Caudal scaled for over half way to the end of the lobes. Anal sheath short, consisting of the edge of three large scales. Lateral line with pores developed on seven to twelve scales, very slightly decurved.

Origin of the dorsal equidistant from the snout and caudal, penultimate ray one-third the longest, which is four in the length. Origin of the anal on the vertical from the third scale behind the dorsal. Anal very deeply emarginate, the longest ray just reaching the base of

the last ray. Ventrals on the vertical from the origin of the dorsal. Ventrals just barely or not quite reaching the anal, pectorals reaching the second scale in front of the ventrals.

Humeral spot small, roundish, or roughly triangular, often intense. A black line at the base of the anal. A narrow black lateral stripe. No true caudal spot, sometimes a dusky spot at the base of each caudal lobe. Each scale of the back often with a single intense dark spot. Scales of the sides often outlined with dusky. Scales of all, except the upper three series, iridescent, the last few on the end and middle of the caudal peduncle rich copper-colored. In life adipose yellow and dorsal yellowish.

***Hemigrammus analis* sp. nov.**

Type, 35 mm. (No. 1466 Carnegie Museum Catalog Fishes.) Rockstone.

Cotypes, 21 specimens, 24–29 mm. Gluck Island. (C. M. Cat. No. 1468, *a–e*; I. U. Cat. No. 11919.)

Cotypes, 72 specimens, 19–36 mm. Rockstone. (C. M. Cat. No. 1467, *a–j*; I. U. Cat. No. 11918.)

Cotypes, 2 specimens, 29–35 mm. Wismar. (C. M. Cat. No. 1469, *a*; I. U. Cat. No. 11920.)

Distinguished by distinct silvery lateral stripe, distinct but not heavy humeral spot. Each mid-dorsal scale with one large round black spot, no caudal spot. Anal short; teeth all multicuspid.

Head 3.5–3.75, depth 3.25–3.50; D. 11, A 12–14; scales 5–30 to 32–3; eye  $2\frac{1}{3}$  in head, snout  $\frac{2}{3}$  of the eye, interorbitals less than the eye, about 2.75 in the head.

Compressed, head at base of occipital process  $\frac{3}{4}$  of the greatest depth. Preventral region rounded, without regular series of median scales, postventral region narrow. Predorsal region rounded, having a regular median series of eight scales.

Occipital process one-fifth of the distance from its base to the origin of the dorsal, bordered by two or three scales. Interorbitals flat. Frontal fontanel small, triangular, narrower than the parietal; half the length of the parietal without the occipital groove. Second sub-orbital leaving a narrow naked margin below and behind. Snout short. Mouth large. Lower jaw protruding beyond the upper when the mouth is open. Maxillary not so long as the eye. Mandible equal to the eye. Premaxillary with three or four five-pointed teeth in the outer row and five five-to seven-pointed teeth in the inner row.

Maxillary with two or three six- to seven-pointed chisel-shaped teeth. Dentary with four broad seven-pointed teeth followed by three or four minute teeth on the sides.

Gillrakers about  $6 + 9$ .

Scales cycloid, regularly imbricate, no interpolated scales or rows of scales; striæ few, variable in number. Caudal scaled half way to the end of the longest rays. Anal sheath of three or four normal scales, which extend over the bases of the first seven or eight rays. Axillary scale present. Pores developed on seven or eight scales; lateral line slightly decurved.

Origin of the dorsal about equidistant from the snout and caudal, the penultimate ray 0.4 of the longest, which is  $3\frac{2}{3}$  in the length. Origin of the anal on the vertical from the second scale behind the dorsal; anal emarginate, longest ray equal to the base; caudal half the length of the eye longer than the head. Ventrals on the vertical from the first dorsal ray; ventrals just reaching the anal. Pectorals not reaching the ventrals.

Humeral spot distinct, but not heavy, not conspicuously elongated. Lateral stripe the width of one scale, not so intense as the humeral spot, expanded on the caudal peduncle, but not continued upon the fin; scales overlying the lateral stripe distinctly silvery. No caudal spot. First five anal rays, the caudal, and all of the dorsal dusky. Each median dorsal scale with a roundish dark spot. Scales of the upper half of the sides outlined with dusky. A few chromatophores scattered about the base of the anal and aggregated so as to form a small dark spot or line on the ventral side of the caudal peduncle. Top of the head dark. The lateral stripe probably red in life.

Genus *HYPHESSOBRYCON* Durbin.

***Hyphessobrycon minor*** sp. nov.

Type, 19 mm. (No. 1189 Carnegie Museum Catalog of Fishes.) Konawaruk.

Cotypes, 2 specimens, 21–25 mm. Konawaruk. (I. U. Cat. No. 11767.)

Distinguished by intense submarginal black dorsal spot on the first six or seven rays. Tips of first dorsal rays and an area just below the black spot white. Humeral spot black, small, vertically elongate. Teeth in inner row of premaxillary and maxillary not narrowly tricuspid nor conical. Small slender fishes with small mouth.

Head 3.5, depth 3.8 ; D. 11, A. 26 to 28 ; scales 5-32 to 34-3 ; eye 2.5 in head ; interorbitals less than the eye, about 3 in the head.

Compressed, head at the base of the occipital process  $\frac{4}{5}$  of the greatest depth. Preventral region rounded, with complete median series of ten or eleven scales. Postventral region narrow. Predorsal region rounded with complete median series of nine scales.

Occipital process about one-fifth of the distance from its base to the dorsal, bordered by two scales. Interorbitals slightly convex. Frontal fontanel triangular, narrower than the parietal, three-fourths the length of the parietal fontanel without the occipital groove. Second sub-orbital leaving narrow naked margins behind and below, the lower margin being a mere line. Snout short,  $\frac{2}{3}$  the length of the eye. Mouth small. Maxillary less than the eye, about 3 in the head ; mandible equal to the eye, about 2.5 in the head. Premaxillary with one or two narrow tricuspid teeth in the outer row and five three- to five-pointed teeth in the inner row. Maxillary with two or three broad three- to five-pointed teeth. Dentary with four or five three- to five-pointed teeth in a graduated series followed by several minute conical or three-pointed teeth on the sides.

Scales cycloid, regularly imbricate, no interpolated scales or rows of scales ; striæ few, variable in number. Caudal naked. Anal sheath short of five scales covering the base of the first eight or nine rays. Pores developed on seven scales, lateral line very slightly decurved.

Origin of the dorsals equidistant from the snout and caudal, penultimate ray little more than one-third the longest which is 3.8 into the length. Origin of the anal on the vertical from the fourth dorsal ray. Anal emarginate, the longest ray twice into the length of the base. Ventrals on the vertical from the first or second scales in front of the dorsal. Ventrals reaching the third anal ray ; pectorals reaching just beyond the base of the ventrals.

Humeral spot small, black, vertically elongate. No caudal spot. Lateral stripe extremely narrow and line-like, interrupted and very faint. Scales of the back and upper half of the sides outlined with dusky. Dorsal with an intense black bar on the outer half of the anterior six or seven rays. The tips of the second, third, and fourth rays and a streak directly below the black bar, white. Last half of anal rays with blackish tips. Caudal, anal, ventrals, and pectorals a little dusky.

***Hyphessobrycon rosaceus* sp. nov.**

Type, 35 mm. (No. 1190 Carnegie Museum Catalog of Fishes.)  
Gluck Island.

Cotypes, 25 specimens, 19–38 mm. Gluck Island. (C. M. Cat. No. 1191, *a-e*; I. U. Cat. No. 11768.)

Cotype, 1 specimen, 34 mm. Rockstone. (C. M. Cat. No. 1192, *a*.)

Distinguished by an intense round black spot on the first seven dorsal rays, the tips of the second and third dorsal rays milk-white. No humeral or caudal spot. Anal 26 or 27. Teeth of the maxillary and premaxillary small, conical, and tricuspid. Eye large.

Head  $3\frac{1}{3}$ – $3\frac{2}{3}$ , depth 2.75; D. 11, A. 26 or 27; scales 5–31 to 33–3; eye 2.5 in head; interorbitals almost equal to the eye, 2.6 in the head.

Compressed, head at base of occipital process two-thirds of the greatest depth. Preventral region rounded, without complete series of median scales; post-ventral region narrow. Predorsal region rounded, without complete series of median scales, slightly keeled.

Occipital process about one-fifth of the distance from its base to the dorsal, bordered by three scales. Interorbitals somewhat convex. Frontal fontanel triangular, as wide as the parietal and almost equal to the length of the parietals without the occipital groove. Second sub-orbital with a narrow naked margin behind but not below; third sub-orbital very small. Maxillary equal to the eye; mandible longer than the eye, 2 + into the head. Lower jaw included only when the mouth is closed. Snout short; mouth large. Premaxillary with two or three narrow tricuspid teeth in the outer row and six to eight small tricuspid and conical teeth in the inner row. The two rows of premaxillary teeth not so far apart as in most species of the genus. Maxillary with four to six very small narrowly tricuspid or conical teeth. Dentary with a graduated series of five three- to five-pointed teeth, followed by about eight minute teeth on the side.

Gillrakers 8 + 12.

Scales cycloid, regularly imbricate, no interpolated scales or rows of scales, striæ few, variable in number. Anal sheath short, composed of four or five scales covering the base of the first seven or eight anal rays. Lateral line with pores developed on six or seven scales, slightly decurved.

Origin of dorsal about half the length of the eye nearer the snout

than the caudal, the penultimate ray almost one-third of the longest, which is three to three and one-half in the length. Caudal equal to the head. Origin of the anal on vertical from the middle dorsal ray; anal emarginate, the longest ray 1.5-2 into the base. Rays very close together. Ventrals on the vertical from the first scale in front of the dorsal. Ventrals just reaching the first or second anal rays. Pectorals reaching a little beyond the base of the ventrals.

Humeral and caudal spots lacking. Scales of the back outlined with dusky. The entire sides except over the body-cavity with scattered chromatophores, which are a little thicker on the caudal peduncle and on the third and fourth scales of the lateral line and the three scales above them. The chromatophores are thinner over a small vertically elongate area immediately behind the humeral area just described. The lateral stripe very slender, extending entirely to the caudal. Dorsal with a round intensely black spot on the first seven rays; the tips of the second and third rays white. The distal half of the longest anal ray and the tip of the next ray also white. All the fin-rays dusky. Scales on the sides with a pale blue iridescence. In life, a general rosy tinge, especially above anal, base of caudal lobes, and ventrals. Anal lobe and base and tip of dorsal lobe bright orange.

***Hyphessobrycon minimus* sp. nov.**

Type, 18 mm. (No. 1193 Carnegie Museum Catalog Fishes.) Cane Grove Corner.

Cotypes, from 16-21 mm. Cane Grove Corner. (I. U. Cat. No. 11769.)

Distinguished by intense caudal spot only slightly continued upon the caudal rays; a narrow black lateral stripe from the first or second scale in front of the caudal spot to the top of the preopercle, a little wider and less intense in the humeral region; no real humeral spot. Head at base of occipital process about  $\frac{5}{6}$  of the greatest depth; occipital process short.

Head  $3\frac{1}{3}$ - $3\frac{2}{3}$ , depth  $3\frac{1}{2}$ - $3\frac{3}{4}$ : D. 11, A. 16 or 17; scales 5-30 to 33-3; eye 2 + in head; snout less than the eye; interorbitals less than eye, about 3 in the head.

Compressed, head at base of occipital process  $\frac{5}{6}$ , or equal to the greatest depth. Preventral region rounded without regular complete series of median scales. Postventral region narrow. Predorsal region rounded, with a regular series of nine or ten median scales almost reaching the occipital process.



Occipital process short ; bordered by one to one and one-half scales. Frontal fontanels much narrower than the parietal, about three-fourths the length of the parietal without the occipital groove. Second sub-orbital with narrow naked margins behind and below. Snout short, about one-half the length of the eye ; mouth moderately large. Maxillary less than the eye, 2.75 in the head. Mandible a little more than 2 in the head.

Premaxillary with two, rarely three, small tricuspid teeth in the outer row, and five broad five- to seven-pointed teeth in the inner row, the tooth at the median end of the inner row of each premaxillary fitting together, so that the two apparently form a single very large median tooth. Maxillary with two or three broad five- and seven-pointed teeth. Dentary with four large seven-pointed teeth followed on the sides by one or two minute tricuspid teeth.

Scales cycloid, regularly imbricate, striæ few, variable in number, no interpolated scales or rows of scales. Caudal naked. Anal sheath of three scales covering the base of the first five or six rays. Lateral line with pores developed on five to eight scales, slightly decurved.

Origin of the dorsal equidistant from the snout and caudal, its longest ray  $3\frac{1}{2}$  into the length. Origin of anal on the vertical from the last two or three dorsal rays. Anal emarginate, the longest ray  $1\frac{1}{2}$  into the base. Ventrals on the vertical from the second dorsal ray. Ventrals just reaching the anal ; pectorals just reaching the ventrals.

Caudal spot intense black, roundish, and scarcely if at all continued upon the caudal rays. Humeral spot lacking, but the intense narrow black lateral stripe widened somewhat in the humeral region. Scales of the back and sides above the lateral stripe heavily outlined with dusky. All the fins somewhat dusky, but without distinct markings of black or white. Sides over the lateral stripe and below it with a steel-blue iridescence. Preopercle also with blue iridescence.

***Hyphessobrycon eos* sp. nov.**

Type, 36 mm. (No. 1194 Carnegie Museum Catalog Fishes.) Creek between Potaro Landing and Kangaruma.

Cotypes, 24 specimens, 35 to 42 mm. Creek between Potaro Landing and Kangaruma. (C. M. Cat. No. 1196, *a-e* ; I. U. Cat. No. 11770.)

Cotypes, 43 specimens, 19-34 mm. Tukeit. (C. M. Cat. No. 1195, *a-j* ; I. U. Cat. No. 11771.)

Distinguished by an intensely black spot covering the ventral two-thirds of the caudal peduncle, not continued upon the caudal rays. Humeral spot faint, vertically elongate, scarcely visible on very dark specimens. Maxillary teeth mostly conical, largest teeth with never more than three points. Maxillary equal to the eye.

Head 3.25-3.33, depth 2.5-2.7; D. 11, A. 17-20; scales 6-33 or 34-4; eye 2.5 in head; snout about  $\frac{1}{2}$  the eye; interorbitals almost equal the eye, 2.75 in head.

Compressed, head at base of occipital process  $\frac{2}{3}$  of greatest depth. Preventral region rounded, without complete, regular series of median scales. Postventral region narrow. Predorsal region rounded with complete series of ten median scales.

Occipital process about one-eighth of the distance from its base to the dorsal, bordered by two or three scales. Interorbitals slightly more convex than in any other species of this genus. Frontal fontanel small, triangular, narrower than the parietal and two-thirds the parietal without the occipital groove. Second suborbital leaving a narrow naked margin behind but none below. Snout short, mouth large, lower jaw protruding beyond the upper when the mouth is open. Maxillary equal to the eye; mandible scarcely longer than the eye, about 2.3 in head. Premaxillary with three or four narrow tricuspid teeth in the outer row and five or six tricuspid teeth in the inner row. Maxillary with five to seven conical or very narrow three-pointed teeth. Dentary with a series of four or sometimes five tricuspid teeth followed by a graduated series of seven to ten minute conical and three-pointed teeth on the side.

Gillrakers about 6 + 10.

Scales cycloid, regularly imbricate, striæ several, variable in number; no interpolated scales or rows of scales. Anal sheath of four to seven scales covering the bases of the first seven rays. Caudal naked; an axillary scale. Pores developed on seven to ten scales; lateral line only very slightly decurved.

Origin of the dorsal equidistant from the caudal and snout; penultimate ray one-third the longest, which is 3-3.25 into the length. Origin of anal on the vertical from the last dorsal ray. Anal very slightly emarginate, third ray not reaching to the base of the last ray, the longest ray  $\frac{3}{4}$ -the length of the base, anal armature well developed. Caudal equal to the head. Ventrals weak, on the vertical from the first scale in front of the dorsal, or from the first dorsal ray; ventrals

barely reaching the anal. Pectorals just reaching the ventrals, pectorals distinctly longer than ventrals.

Humeral spot very faint, vertically elongated, very near the head. Lateral stripe narrow and very indistinct. Caudal spot intensely black covering the ventral two-thirds of the caudal peduncle, a little narrower in front than on the vertical from the origin of the lower caudal lobe, not continued upon the caudal rays. Top of head and dorsal scales very dark, scales of upper half of the sides heavily outlined with dusky. All fin-webs dusky. Numerous chromatophores scattered over the rest of the body, especially large and prominent on the cheeks.<sup>3</sup> Anterior half of anal, base of anal, sides just above the anal, and ventrals reddish; caudal red or orange to deep yellow, lower lobe often more colored than the upper; base of dorsal, pectorals, cheeks, and under part of head yellow.

***Hyphessobrycon stictus* sp. nov.**

Type, 38 mm. (No. 1197 Carnegie Museum Catalog of Fishes.)  
Lama Stop-Off.

Cotypes, 108 specimens. Maduni Creek. (C. M. Cat. No. 1435, *a-j*; I. U. Cat. No. 11895.)

Cotypes, 116 specimens, 22–39 mm. Lama Stop-Off. (C. M. Cat. No. 1436, *a-z*; I. U. Cat. No. 11896.)

Cotype, 1 specimen. Rockstone. (C. M. Cat. No. 1437.)

Cotypes, 10 specimens. Christianburg Canal. (C. M. Cat. No. 1438, *a-e*; I. U. Cat. No. 11897.)

Cotype, 1 specimen. Canegrove Corner. (C. M. Cat. No. 1439.)

Distinguished by distinct humeral spot in a light area; center of humeral spot equidistant from posterior margin of the eye and the dorsal; no caudal spot. Anal long. Teeth many pointed.

Head 3.5 to 3.8, depth 2.75 to 3.25; D. 11, A. 26–31; scales 6–33 to 35–4; eye 2.25 in head; snout one-half of eye; interorbitals less than the eye, about 2.5 in head.

Compressed, head at base of occipital process two-thirds to three-fourths the greatest depth. Preventral region rounded, without regular complete series of median scales. Postventral region narrow. Predorsal region rounded, with complete series of nine to eleven median scales.

<sup>3</sup> All specimens at hand were preserved in formalin and so have the black pigment emphasized.

Occipital process one-fifth of the distance from its base to the dorsal, bordered by three scales. Interorbitals very slightly convex. Frontal fontanel large, triangular, only slightly narrower than parietal, as long as the parietal without the occipital groove. Second suborbital with naked margins behind and below. Snout short. Mouth moderately large. Lower jaw protruding beyond the upper when the mouth is open. Maxillary not so large as the eye. Mandible equal to the eye. Premaxillary with two or three, rarely four, small five- to seven-pointed teeth in the outer row, and five large seven- to nine-pointed teeth in the inner row. Maxillary with one to three broad seven-pointed teeth. Dentary with five or six large seven- to nine-pointed teeth followed by two or three very small, but multicuspid, teeth on the side.

Gillrakers about  $5 + 11$ .

Scales cycloid, regularly imbricate, no interpolated scales or rows of scales; striæ few, variable in number. Base of the caudal sometimes a very little scaled, the broad terminal scale often wanting. Anal sheath short, composed of four scales covering the bases of the first six rays. Axillary scale developed. Pores on seven to eleven scales; lateral line slightly decurved.

Origin of the dorsal a third of the length of the eye nearer the base of the caudal than the snout; penultimate rays 0.4 of the longest, which is  $2\frac{1}{2}$  to  $2\frac{2}{3}$  into the length. Origin of anal on the vertical from the last dorsal ray; longest ray 1.66 in the base, which is 1.2 times the head. Ventrals on the vertical from the first or second scale in front of the dorsal, ventrals just reaching the anal. Pectoral never reaching beyond the second scale in front of the ventrals.

Humeral spot round, very intense, surrounded by a light ring, very frequently with a less intense dark bar extending obliquely downwards and forwards and another shorter bar extending obliquely upwards and forwards. A faint secondary humeral spot the width of two scales behind the first. Lateral stripe sharp and very narrow, not reaching the caudal, no caudal spot. Dorsal scales outlined with dusky. Top of head very thickly covered with chromatophores. Fins all a little dusky. Sides silvery, iridescent. Caudal peduncle as far as the front of adipose, the adipose and caudal, except the lobes, very rich cherry-red. Caudal lobes, anal, and dorsal canary-yellow.

### III. CONTRIBUTIONS TO A KNOWLEDGE OF THE ODONATA OF THE NEOTROPICAL REGION, EXCLUSIVE OF MEXICO AND CENTRAL AMERICA.

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In the collections which various museums loaned to me for study as material for the account of the Odonata lately published in the "*Biologia Centrali-Americana*," many species were represented, which do not form part of the Mexican-Central-American fauna, as far as we know. The present paper deals especially with these species, but does not pretend to give a complete list of Neotropical Odonata. Different groups have been treated with different degrees of fulness for various reasons, and the title of the paper, it is believed, exactly expresses its scope. Some of the "*Biologia*" records also have been repeated in order to add further information which lay outside the limitations of that group.

The largest part of the material here dealt with is the property of the Carnegie Museum of Pittsburgh, to the Director of which, Dr. W. J. Holland, I am indebted for the opportunity of studying it. Other parts come from the U. S. National Museum, thanks to Dr. L. O. Howard and the late Dr. W. H. Ashmead; from the Museum of Comparative Zoölogy, Cambridge, Mass., thanks to Mr. Samuel Henshaw; and from the Academy of Natural Sciences of Philadelphia, where Dr. Henry Skinner has given me the freest use of the Odonate collections. The original sources of these various collections are given below.

In the citation of previous literature the usual but not invariable rule has been to give no references, if Mr. Kirby's Catalogue of Odonata (1890) quotes all the important descriptions of a given species. If some later work deals with a species more fully, or gives the specific bibliography more completely, that work has been quoted.

The Comstock-Needham terminology of the wing-veins has been used, but, in order to facilitate comparisons with the older descrip-

tions, the Comstock-Needham name of a vein is often followed by the Selysian name in parentheses, especially in the first part of the paper.

Finishing this manuscript on the eve of departure for Central America, it is a pleasure, as well as a duty, to acknowledge the kindness of Dr. Holland in undertaking the burden of proof-reading, which distance renders impracticable for the author.

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The principal collections on which the paper is based are :

1. *Collections made in the northwestern corner of the Department of Magdalena, Colombia, adjoining Santa Marta, by Mr. and Mrs. Herbert H. Smith, between March, 1898, and September, 1901.*

Mr. Smith has given a description of this district of Santa Marta, with notes on the localities, in the *Bulletins of the American Museum of Natural History*, vol. xx, pp. 408-414, 1904. From these notes we extract the following having relation to the Odonata :

“ *Bonda* : Village on the river Manzanares, seven miles east of Santa Marta. This was our headquarters during the greater part of our stay in Colombia. The village itself is only 150 feet above sea-level, but most collections were made in somewhat higher land. The country is hilly, covered in great part with dry forest with intervals of open grass land on the ridges. A thin line of mountain forest adjoins the river.

“ *Cacagualito* : Plantation, twenty miles east of Santa Marta, 1,500 feet ; vegetation principally mountain forest, which here extends to a lower level. Jordan is a plantation two miles further east, in a valley, at 1,000 feet.

“ *Cienega*, or *La Cienega* : Town on the coast adjoining the great lagoon of the same name ; the lagoon belongs to the estuary system of the Magdalena. The country around is flat, swampy in places, and with salt plains ; two or three miles back are dry hills with a scrubby growth (dry-forest vegetation). Rio Frio is a town a few miles south of Cienega, on a river of the same name ; Gaira, on the Gaira River, is between Cienega and Santa Marta, on low land. These towns are connected by a railroad.

“ *Don Amo* : Plantation, eighteen miles east of Santa Marta, in a mountain valley, at 1,500 feet ; large clearings in mountain forest, with adjoining dry forest and open lands. Don Amo Viejo is a locality near it.

“*Don Diego*: Plantation on the coast at the mouth of the river Don Diego, five miles east of the Buritaca, and with similar surface and vegetation” [*i. e.*, “The mountain forest here” — at Buritaca — “comes down bodily to the coast, where there are sand-beaches and mangrove-swamps; the country is low and damp. There are small tracts of open grass land near the river mouth”].

“*Minca*: Plantation on the river Gaira, twelve miles southeast of Santa Marta, at the lower border of the main mountain forest, which here adjoins dry forest and open grass lands. Elevation 2,000 feet.

“*Onaca*: Plantation, eighteen miles E.S.E. of Santa Marta, at the lower border of the main mountain forest, which here adjoins the open lands. Elevation 2,000 feet.

“*Valparaiso*: Plantation near the head of the river Gaira, twenty miles southeast of Santa Marta, 4,500 feet. Extensive clearings in the mountain forest. Las Purtidas is a locality near it at 3,500 feet.”

Mr. Smith emphasizes the difference between mountain forest and dry forest, believing the difference to be interesting and significant.

“The true mountain forest is a matted growth of trees and vines with numerous epiphytes and ferns; very few trees shed their leaves at stated seasons, and the forest is damp and verdant throughout the year. In the dry forests, on the contrary, nearly all the trees and vines are leafless during the latter part of the dry season, February to May; the few peculiar ferns die down to the roots. Grasses and herbs are abundant wherever the ground is not too shady, but they wither during the dry months. The distinction of plant species is almost complete, and is all the more remarkable because the two kinds of forest exist side by side.” “I have been thus explicit in describing the two kinds of forest because they exist in all parts of tropical America. . . . The ‘pampa’ [dry forest] of the Santa Marta district is the ‘campo’ and ‘coatingo’ of Brazil, and the scrubby growth of lower hills in the West Indies; a modified form is the ‘chapparal’ of Mexico. Everywhere the plants are different from those of the swamp forest; generally the trees are lower, often small and gnarled and sometimes scattered; and everywhere they shed their leaves during the dry season. The difference does not always correspond to a difference of soil or situation; the two kinds of forest may adjoin each other on level ground or on a mountain side, on land equally dry or humid.

“It is impossible to avoid the impression that the dry forest is an old, stunted, and worn out vegetation, tending to extinction, while

the swamp forest, with its exuberant growth, is plant life in the vigor of youth. . . . It is possible that the dry forest, with its open lands or 'campos,' represents an older flora.'<sup>1</sup>

2. *Collections Made in Brazil, Bolivia, Paraguay, and Argentina by Mr. and Mrs. H. H. Smith in 1885 and 1886.*

The following notes are taken from letters from Mr. Smith to the author, dated December 6, 1908 and April 24, 1905.

*Brazil.*

" *Cachoeira* : This is a stream, or small river, which rises near Chapada, flows N. then N.E. and finds its way to the R. Cuyabá. The collections with this label were made at a place about fifteen miles N.E. of Chapada, where the river passes through a gap in the hills. Forest and grass-land with some boggy places. Practically the same as Chapada.

" *Chapada* : A small village of Matto Grosso, Brazil, about twenty-five miles E.N.E. of Cuyabá, on the plateau. The village itself is about 2,500 ft. above sea level, or 1,800 ft. above Cuyabá; but collections are from all the surrounding region as low as 1,500 ft. This is a country of mixed forest and campo, or grass-land with scattered trees; there are many streams — some small lakes or ponds, and tracks of more or less boggy savanna where the streams rise.

" The name Chapada is really a generic appellation, applied to the plateau in general. The real name of this village is *Santa Anna La Chapada*, and in some maps it appears as *Santa Anna*; but in all that region it is known simply as Chapada, or *the* Chapada.

" *Cuyabá* : The capital of Matto Grosso, on the R. Cuyabá, a branch of the Paraguay. There is very little flood-plain here; mostly rocky land, but well watered by streams.

" *Corumbá* : A town on the River Paraguay, near the junction of the Taguary, the port of entry for Matto Grosso. There is a tract of dry rocky land, a kind of island, in the flood-plain of the Paraguay, which is here very extensive. Collections were made principally on the flood-plain; the waters were rising, but I used to wade about with a boy pushing a canoe through the grass behind me. These flood-plains are mostly open grass-land, with some forest along the river and channels.

<sup>1</sup> For similar statements concerning the Brazilian flora and fauna see the notes by Mr. Smith prefixed to Mr. E. T. Cresson's "Descriptions of Some Brazilian Mutilla" (*Trans. Amer. Ent. Soc.*), xxviii, pp. 1-3. 1902.



“*Uacaryzal*: I am not quite sure of this locality. It is a plantation in Matto Grosso either near the R. Paraguay, or near Cuyabá. I *think* that it is on the Paraguay, not far above the junction of the R. Cuyabá; at any rate, there is a cattle plantation there, where we worked for some time.

“You have only a fragment of my Matto Grosso collection of Odonata; the only serious loss I had in transit was in this group. I had a large “Saratoga” trunk, packed full with specimens, mostly collected along the R. Paraguay in Matto Grosso. In transferring our luggage at Monte Video this trunk disappeared. It must have contained several thousands of specimens, and an especially fine lot. Those I did bring home were turned over to Dr. Hagen for study. After his death they remained at the Museum of Comparative Zoölogy until after I sold my collection to the Carnegie Museum. I have not seen them for 20 or 25 years, and have no idea what condition they are in. The trunk I mentioned contained a lot of the rare species, which fly only in the evening after sunset, and in the early morning. I used to get up before daylight to catch them. The colors of this species are rather dull.

“Along the Paraguay, just before leaving Matto Grosso, I made a discovery, which might have been very important had I remained there. The best time to get rare dragon-flies is before sunrise in the morning. Nearly all the species which are dull brownish or greenish in color — no pronounced tints — are either nocturnal, or at any rate, can be found flying as soon as there is light enough to see them. They also fly in the evening, but are less abundant then.

#### *Bolivia.*

“*Piedra Blanca* (in Portuguese Pedra Branca). A small trading station and custom house, four miles W. of Corumbá, and just within the boundary of Bolivia. A road runs from here over the plains to the larger Bolivian towns of the Andes. Piedra Blanca is on the edge of the flood-plain of the R. Paraguay; there is a lake communicating with the river near Corumbá. Practically the collections are the same as those of Corumbá, and I only kept them separate because they are from within the confines of Bolivia.

#### *Paraguay.*

“*Villeta*, a village in Paraguay, as I remember, about twenty miles S. of Asuncion; at any rate it is a village on the R. Paraguay, noted

for its orange groves. The collections were made close to the river."

To many of his specimens Mr. Smith attached numbers, corresponding to those under which he made notes on the living colors of the insects. The note-book containing these is, unfortunately, not available, but I have preserved his numbers in the following text in the event of these notes coming to light in the future.

3. *Collections Made by Mr. J. D. Haseman, in Various Parts of Brazil, in 1907 and 1908.*

I have no information concerning them other than that given on the labels, which are here quoted exactly, nor have I been able to locate many of his localities on the maps.

The collections by Mr. and Mrs. Smith and Mr. Haseman are in the Carnegie Museum, Pittsburgh.

4. *Collections Made at Sapucay, Paraguay, by Mr. W. T. Foster, now in the U. S. National Museum.*

Mr. A. N. Caudell, in his paper "On a Collection of Non-Saltatorial Orthoptera from Paraguay" (Journ. N. Y. Ent. Soc., xii, pages 179, 180, Sept., 1904), gives the following information about this locality, quoting from a letter from Mr. Foster, dated May 14, 1902. "Sapucay is a small village situated at the base of a low table-land, the elevation of which is 800 feet above the surrounding country. . . . The trend of the face of the table-land is northwest and southeast. The country to the southwest and east is generally level, broken by low hills rising abruptly from the plains, which extend to the level cattle-breeding lands of the Missions, which in turn give place to the low swamp-land of the southwest corner of Paraguay, which, with the exception of a narrow fringe along the rivers Parag  y and Alto Parana, is given over to the anaconda and tiger (jaguar). I was several months down there collecting water-birds, but do not have any very pleasant recollections of the district. Periodical floods extend for leagues inland, filling up the swamps, which in turn extend for miles; patches of forest from a few hundred feet to a mile in diameter occupy any land rising a few feet above the swamp. A few wandering tribes roam the large forests of the Alto Parana, but the rest is a desolate waste.

"I do not find that the table-land mentioned above bears a different fauna than that of the low lands, nearly all specimens taken by my collecting boys on the higher lands being duplicated by others from the plains.

“The winter is now about commencing and the frost during the months of June and July is somewhat severe, with the result that insects are correspondingly scarce. I therefore do but little collecting during the winter months, but turn my attentions to bird and mammal skinning.”

5. *Collections, not yet Fully Worked Out, Made by Mr. W. J. Gerhard in Peru and Bolivia, in 1898 and 1899, now in the Academy of Natural Sciences of Philadelphia.*

Mr. Gerhard's itinerary is given on pages 11-27 of Andrew Gray Weeks, Jr.'s "Illustrations of Diurnal Lepidoptera With Descriptions. Boston Printed by the University Press Cambridge, U. S. A. 1905."

## LIST AND DESCRIPTIONS OF SPECIES.

### 1. *Lais guttifera* Selys.

♂. Individuals vary as to the presence or absence of occipital tubercles. The yellow of the inferior part of the metepimeron is one-third to one-fourth as wide as the sclerite and is absent in the oldest examples. Pale, cleft, anterior lamina one-third to two-fifths as long as segment two, posterior hamule very hairy anteriorly. Young males have hardly any coloring at the tip of the hind wings. Tips of the inferior appendages in profile view slightly bifid, upper branch curved upward and cephalad.

*Dimensions.* — *Chapada*: abdomen ♂ 35.5–37, ♀ 30.5–34; hind wing ♂ 25.5–28, ♀ 26.5–28 mm.

*Sapucay*: abdomen ♂ 37.5–40.5, ♀ 34; hind wing ♂ 28–30, ♀ 29 mm.

*Habitat.* — BRAZIL: Chapada, by H. H. Smith, 6 ♂ and parts of 8 others, 5 ♀ and parts of 7 others. Carnegie Museum, Pittsburgh. PARAGUAY: Sapucay, by W. T. Foster, December, 1899, 1 ♂ No. 69; January, 1900, 2 ♂ no. 69; February, 1900, 1 ♂, 1 ♀. United States National Museum.

### 2. *Lais fulgida* Selys.

Founded on a young male from Rio Napo, Ecuador, “de sorte que la gouttelette terminale obscure des ailes inférieures n’est que faiblement indiquée.”

In 1880, de Selys wrote (Compt.-Rend. Soc. Ent. Belg., 1880, p. 1): “La *fulgida* différerait des trois autres [*hauxwelli*, *devillei*, *cupræa*] par le bout des ailes inférieures du male sans gouttelette obscure, mais légèrement grisâtre, se rapprochant ainsi de la *metallica* dont elle n’est peut-être pas distincte.”

The present pair from Iquitos were labeled “*fulgida*?”, representing possibly Hagen’s identification. They agree with the original description of *fulgida* in size, in the brilliant coppery color of thorax and of abdomen, and in the superior appendages of the male. The hind wings of the male, however, have a well-marked brown spot at

the apex similar to that of *L. hauxwelli*.<sup>2</sup> The male is also like *hauxwelli* in having the inferior appendages undeveloped. *Fulgida* therefore belongs to the same group of species as *hauxwelli* and should be so transferred in de Selys' synopsis of the genus, *l. c.*, p. li. Like *guttifera*, *devillei*,<sup>3</sup> and doubtless other species, the young males of *fulgida* have the apical brown spot of the hind wing not yet distinctly developed.

*Habitat.* — PERU: Iquitos, Staudinger, 1 ♂, 1 ♀. Museum of Comparative Zoölogy, Cambridge, Mass.

### 3. *Lais pruinosa* Selys.

The male has a pair of occipital tubercles, inferior half of the metepimeron yellow, the pale cleft anterior lamina one-fourth as long as 2, the posterior hamule not hairy anteriorly.

*Habitat.* — BRAZIL: Rio Grande do Sul, by H. H. Smith, 1 ♂ (lacking the tip of the abdomen), 1 ♀. Carnegie Museum, Pittsburgh.

### 4. *Lais pudica* Selys.

(PLATE IX, FIGS. 149-151, 155.)

The wings of young males are brown without any red (except the apices which remain uncolored throughout life). Subsequently, red appears in the midst of the brown and gradually occupies the whole of the previously brown area.

The wings of the female remain brownish throughout life, although this color occupies a smaller area than in the male.

*Habitat.* — BRAZIL: Chapada, by H. H. Smith, 1 ♂ and parts of 4 others No. 73, 2 ♀ and parts of 4 others No. 76. Carnegie Museum, Pittsburgh. São Paulo, March 28, 1900, 1 ♂, 3 ♀; and Rebouças, September 26, 1900, 1 ♂, collected by A. Hempel. Academy of Natural Sciences, Philadelphia.

PARAGUAY: Sapucay, January 16, 1903, by W. T. Foster, 6 ♂ No. 17, 6 ♀ No. 6. U. S. National Museum.

### 5. *Hetærina fuscibasis* sp. nov.

(PLATE I, FIGS. 1, 2; PLATE IX, FIGS. 152, 153.)

♂. Black, except as follows: second joint of antennæ brown anteriorly, two elongated pale brown spots on the second lateral thoracic

<sup>2</sup>There is a pair of *hauxwelli* from Brazil (no definite locality) in the Carnegie Museum, Pittsburgh.

<sup>3</sup>Cf. Selys, *l. c.*, p. l.

suture, thorax with slight metallic-green or metallic-copper reflections, anterior abdominal segments with slight metallic-violet or metallic-green reflections; labrum in a younger male with a pale spot on each side.

Superior abdominal appendages longer than 10, as long as 9, forcipate, black outer margin with 4-5 spines in the distal half, inner margin widening gradually from the first to the second third of the appendage length; beyond the point of greatest length the upper surface bears an oblique row of small denticles and distal to the row a transverse ridge, the inner (mesal) end of which forms a slight projection on the inner edge of the appendage at three-fourths length when seen from above, apex obtuse, rounded. In profile the lower margin is distinctly convex in the third and fourth fifths, or middle third, of the appendage length, corresponding to the widening of the inner margin as viewed from above.

Inferior appendages five- to six-tenths as long as the superiors, black; in profile view curved slightly upward, tapering from base to apex; in ventral view, as distant from each other as the superiors, only slightly curved toward each other.

Legs black.

Wings dark brown for their entire width from base to nodus, uncolored beyond, the outer edge of the brown extending in a usually somewhat zig-zag line to the hind margin of the wing in such a way that the hind edge of the brown is a little shorter (9-10 mm.) than its front edge (10-11 mm.). Apex of hind wing edged with brown from the second to the sixth cell before the termination of  $R_1$  (= median vein of de Selys) to the termination of the second of the three longer supplementary sectors below  $M_1$  (= principal sector of de Selys), or 2-3 cells posterior or anterior thereto. No trace of a pterostigma. Front wings with two or three rows of cells in the greater part of the anal area (= proximal part of the postcostal space of de Selys) to the level of the distal end of the quadrilateral, when there are two rows, then near the distal end of that area are three rows or three cells here and there; three or four rows in a great (middle) part of second cubital area<sup>4</sup> (= distal part of the postcostal space of de Selys); 3-5 cross-veins in the basal median area (= median space of de Selys, 1896), 4-7 cross-veins in the quadrilateral, 17-19 ante-, 29-35 postnodals. Hind wings with

<sup>4</sup> Mr. Williamson has denoted this area also by the letters AN AR, *anal area*, in his figure 1 (page 168, Proc. U. S. Nat. Mus., xxviii) showing the nomenclature of the venation of a Calopterygine wing.

never more than two rows of cells in any part of the anal area, with two (56 per cent.) or three (44 per cent.) rows at most in the second cubital area (16 wings examined), 3-6 cross-veins in the basal median area, 4-6 cross-veins in the quadrilateral.

♀. Differs from the male in being dark metallic-green with the following parts pale yellowish: anterior surface of the second antennal joint, labrum (except at base, which is black, and a median black line, absent in some), external surfaces of mandibles, proximal parts of the lateral labial lobes, a narrow longitudinal stripe (absent in some) on each side of the middle prothoracic lobe and another on the inferior margin of the prothorax each side, a short inferior mesepisternal stripe bordering the lower end of the humeral suture anteriorly, a subequally long, but narrower posthumeral stripe on the middle of the mesepimeron, an elongated spot on the lower end of the same sclerite, a small spot on the mesinfraepisternum, a stripe (reduced or interrupted in some) on the first lateral suture, two spots (absent in some) on the hind margin of the metepisternum, the lower larger and confluent with the yellow which covers most of the metinfraepisternum, most of the metepimeron (except for a median longitudinal black or metallic-green stripe) wider at its upper end, where it does not reach the base of the hind wing, pectus, which, however, is encircled and transversely crossed with black, in some the margins of the antealar sinus and of wing-bases, a longitudinal lateral stripe on 1-2, 3 or 4, a narrow transverse basal mid-dorsally interrupted ring on 1-7, sides inferiorly of 9 and 10, the genital valves, spots on the coxæ, and a stripe on the proximal third of the second, half of the third, femora.

Abdominal segment 10 with a mid-dorsal longitudinal carina on its posterior half, carina prolonged into a short acute spine projecting beyond the hind margin of the segment, which last is produced slightly backward above and below each abdominal appendage, the produced parts denticulated or spinulose; appendages not quite as long as 10, very acute at tips. Genital valves minutely denticulated.

Wings pale yellowish-brown from base to nodus, this color fading gradually toward the hind margin, at least distal to the level of the quadrilateral; remainder of the wings much clearer. Anal area of front and hind wings and second cubital area of hind wings with never more than two rows of cells, second cubital area of front wings with three rows in its middle. Front wings with 4-6 cross-veins in the basal median area and in the quadrilateral, 16-20 ante-, 27-33 post-

nodals. Hind wings with 3-5 cross-veins in the basal median area and in the quadrilateral.

Abdomen ♂ 31-32, ♀ 27-28; hind wing ♂ 22-24, ♀ 23-25 mm.

*Habitat*. — BRAZIL: Chapada, in May, by H. H. Smith, 2 ♂ and parts of six others, 2 ♀ and parts of six others. Carnegie Museum, Pittsburgh.

This species differs from all other known species of the genus, except *H. borchgravii*, by the entire absence of red on the wings of the male. The brown on these organs recalls *Hetærina titia* Drury, of the extreme southern United States, Mexico, and Central America, but in that species it has been shown,<sup>5</sup> that, while brown first appears on the wings of the teneral individuals, subsequently red is indicated by a pale pink wash over the brown at the base of the front wings. This pink becomes a deeper and deeper red, while the brown is at the same time darkening. No trace of red is apparent in any of the present material of *Hetærina fuscibasis*, although different ages are represented. If the ontogenetic order of the colors on the wings of *Hetærina* males, as described for *H. titia*, *H. capitalis*<sup>6</sup> and *H. tolteca*,<sup>7</sup> has a phylogenetic significance, then *Hetærina fuscibasis* has some claim to be regarded as representing an original, partly brown-winged form, from which the majority of present-day *Hetærinæ*, with their red-based wings, have sprung.

It will also be noticed that the considerable variation in the number of rows of cells in the second cubital area of the hind wings of the male seriously invalidates the grouping of the species of this genus proposed in the work just cited.<sup>8</sup>

#### 6. *Hetærina rosea* Selys.

*Habitat*. — BRAZIL: Chapada, by H. H. Smith, 7 ♂ and parts of 8 others, No. 182; parts of 21 ♀, Nos. 46, 182. Carnegie Museum, Pittsburgh.

#### 7. *Hetærina caja* Drury.

Calvert, *Biologia Centrali-Americana, Neuroptera*, pp. 21, 33, 1901.

*Habitat*. — COLOMBIA: Bonda in Dept. Magdalena, by H. H. Smith, August, 2 ♂. Carnegie Museum, Pittsburgh.

<sup>5</sup> Calvert, *Biol. Centr.-Amer. Neuropt.*, p. 32, 1901.

<sup>6</sup> Calvert, *ibid.*, p. 347, 1907.

<sup>7</sup> *Ibid.*, p. 348.

<sup>8</sup> *Ibid.*, pp. 20-22, 342-343.



8. *Hetærina donna* Selys.

*Habitat*.—BRAZIL: Bom Fim in Bahia State, November 20 and 21, 1907, at the Fazenda de Amaratu, by J. D. Haseman, 4 ♂, 1 ♀. Carnegie Museum, Pittsburgh.

PARAGUAY: Sapucay, by W. T. Foster; November, 1899, 6 ♂ (No. 19), 5 ♀ (No. 20); January 10 and 16, 1900, 1 ♀ (no number) and 1 ♂ (No. 21); February, 1900, 1 ♀ (no number). United States National Museum.

9. *Hetærina auripennis* Burmeister.

*Habitat*.—BRAZIL: Muniz Freire in Espiritu Santo, June 18, 1908, by J. D. Haseman, 2 ♂. Carnegie Museum, Pittsburgh.

10. *Hetærina hebe* Selys.

*Hetærina hebe* Selys, Syn. Calopt., p. 34, 1853; Monog. Calopt., p. 112, pl. 11, fig. 3, 1854.

Two of the present males have the humeral suture occupied by a narrow yellowish stripe for its whole length, but the third (S. Sebastião) has it yellow only for its lower half, the upper half black, thus furnishing the intermediate conditions between those described by de Selys (1854) for the adult ♂ and the young ♂.

The superior appendages of all show a detail not mentioned by de Selys, nor shown in the figures, and which is to be seen only in a supero-internal view, not in dorsal or profile; it is that the dilatation of the inferior inner margin, which forms "une plaque triangulaire obtuse," at mid-length of the appendage is not uninterrupted, but emarginate at one-fourth the appendage length, at which point the "plaque" may be said to begin.

De Selys knew this species only as from "Brésil," wherefore the value of the more exact localities which follow.

*Habitat*.—BRAZIL: Rio Janeiro, December, by H. H. Smith, 1 ♂, 1 ♀. Carnegie Museum, Pittsburgh.

São Sebastião, November, 1900, by A. Hempel, 2 ♂. Academy of Natural Sciences of Philadelphia.

11. *Hetærina longipes* Selys.

The present male is smaller than the type, having the abdomen 41, hind wing 31 mm. Humeral and first lateral yellow stripes narrower, not wider, than in *H. carnifex* from Nova Friburgo, and not anastomosing above near the wings. Metasternum margined with a narrow

black stripe ("la cercle noire de la poitrine"), and with a median longitudinal black stripe on its anterior half and a transverse isolated black mark near its hind end.

*Habitat.* — BRAZIL: Santa Catherina, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

## 12. *Hetærina macropus* Selys.

*Hetærina macropus* Calvert, Biol. Centr.-Amer. Neurop., pp. 21, 34, 346, 1901, 1907.

*Habitat.* — COLOMBIA: Bonda, July, 2 ♀, August, 4 ♂, 5 ♀, September, 2 ♂, 1 ♀, October, 1 ♂, 3 ♀, November, 2 ♂, 1 ♀; Onaca, August, 2 ♂, 2 ♀; Cacagualito, August, 1 ♀; all in Dept. Magdalena, by H. H. Smith. Carnegie Museum, Pittsburgh.

VENEZUELA: La Guaira, by Lyon and Robinson, July 3, 1900, 6 ♂; San Julian, by M. W. Lyon, Jr., July 20, 1900, 4 ♀. U. S. National Museum.

## 13. *Hetærina charca* sp. nov.

(PLATE I, FIGS. 3-5.)

♂. Head black, some metallic-coppery reflections on the upper surface; rhinarium, external surface of mandibles, a small adjoining spot on the genæ, a smaller spot on each side of the labrum, submentum, mentum, and some adjoining parts of the labium, *pale yellow*.

Thorax metallic-green or coppery, the following markings *pale yellowish-brown* or *orange-brown*: a humeral stripe wider below, most of the metapleura (excepting a median dark stripe on the metepisternum reaching from the upper margin of that sclerite down to, or almost to, or half-way to, the metastigma, and a subequally wide or narrower median dark stripe on the metepimeron which reaches to neither the upper nor the lower margins of the sclerite, or the metepisternal stripe broken into two isolated upper and lower streaks, and only a short superior line to represent the metepimeral), a postero-inferior spot on, or all of, the mesinfraepisternum, the metasternum (except for a transverse terminal posterior blackish band). Anterior mesothoracic margin, mid-dorsal carina, upper margin of mesopleura and metepisternum, *black*. Hind lobe of prothorax produced posteriorly.

Abdominal segments 1-4 or 5 pale reddish-brown, 1 with a posterior dorsal metallic-green spot, terminal fourth of 2 darker brown, posterior eighth of 3 and 4 or 5 dark brown or almost blackish; 5 or 6-10 black, mid-dorsal carina of 10 terminating posteriorly in a short projecting spine.

Superior abdominal appendages longer than 10, almost as long as 9, forcipate, black, with a small superior basal orange spot, with 6-8 spines on the outer margin in the apical half. In dorsal view, the inner margin is slightly and convexly enlarged in the proximal third; and from one-third to four-fifths' length is again widened into a large trilobed or tridentate prominence, the first or most proximal tooth or lobe being rounded at tip and situated at one-half the appendage-length, where the appendage reaches its maximum width; the second is more rectangular at tip and at five-sevenths of the appendage length; the third, also rectangular, is at about four-fifths' length, less prominent, but at a higher level than the other two; the upper surface of the appendage bears an oblique row of a few denticles above the proximal tooth or lobe of these three and running towards the second tooth; apex of the appendage obtuse, rounded.

Inferior appendages black, reaching to three-fifths of the length of the superiors, tapering gradually to the apices, which are slightly curved toward each other and minutely bidentate.

Legs black, except the coxæ, which are pale brown with some black spots; in one a pale line on the inner surface of the third femur. All wings pale yellowish between the costa and  $R_1$  (= median vein of de Selys), and with a red spot at the tip between the distal ends of  $R_1$  and  $M_1$  and  $M_{1c}$  or  $M_{1d}$  and extending proximad 5-9 cells posterior to  $M_{1b}$ , a little more densely reticulated than adjoining areas. Red at the base of the front wing occupying the area between  $R$  (= median vein of de Selys) and the hind margin from base to about 5-7 cells distal to the quadrilateral; it also fills the subcostal area for the same distance, or for the first 6-11 antenodals, and narrowly borders the posterior edge of the costal space for the first 3-13 antenodals; the length of the red area from wing-base distad is 6.5-7.5 mm., or a little less or more than half the distance (13 mm.) from base to nodus. Red at the base of the hind wing occupying the area between costa and anal veins (at which latter it may stop sharply or invade the first row of cells below), from base to apex of quadrilateral whence its distal margin extends forward and outward to a point on  $R_1$  (= median vein of de Selys) situated at about five cells distal to the level of the apex of the quadrilateral and 7.5 mm. from the wing-base, whence it again retreats towards the base through the subcostal and costal areas, in which two areas the red is paler and mixed or alternated with brown.

Median space of both front and hind wings, and often also the

quadrilateral of hind wings, with two rows of cells (or at least some double cells) in the distal part of each; distal parts of the quadrilateral and cubital space, and all of the anal area of the front wings, as well as the proximal ends of the areas immediately distal to those named, filled with numerous small closely-set areoles; cubital space of the hind wings with one row of cells throughout, anal area of the same with two rows except at its extreme proximal end. Area  $Cu_2$  on front wings in most cases with three rows of cells for part of its length, on hind wings with two rows. No vestige of a pterostigma. Front wings with 26–32 antenodals, 38–43 postnodals.

♀. Differs from the male as follows: second antennal joint yellow; labrum chiefly yellow, its base, anterior margin, and a median line (sometimes interrupted) black; yellowish-brown humeral area much widened not only by encroachment, especially at the lower or anterior end, on the dark mid-dorsal coloring, but also on that of the mesepimeron, which sclerite is thereby predominantly pale colored; metepimeral dark stripe reduced in length and width; posterior margin of abdominal segment 10 produced inferiorly into two subacute processes on each side, the upper of the two larger and spinulose; abdominal appendages subequal in length to 10, straight, conical, apex acute, blackish, but pale brown at base; femora pale brown inferiorly; wings greenish-yellow, unmarked, but the areas corresponding to those occupied by the apical red spots of the male are slightly more densely reticulated than adjoining areas, to about the same degree as in the male; quadrilaterals and cubital spaces and in some also the median spaces of all the wings, as well as the areas immediately distal, containing but one row of cells each; anal area of the front wings of but two rows of cells, of the hind wings of two rows in its distal part only; area  $Cu_2$  on front wings with 3 (75 per cent.) or 2 (25 per cent.) rows of cells, on hind wings with two rows, rarely 3; front wings with 22–25 antenodals, 30–40 postnodals.

*Young* ♀. — Frons and nasus pale brown, the latter with some metallic reflection, thorax pale brown, none of the markings distinct, metapleura still paler, abdomen and legs brown throughout; otherwise as in the older females.

*Dimensions*. — Abdomen ♂ 41–43, ♀ 32–36; hind wing ♂ 30–31.5, ♀ 29–33 mm.

*Habitat*. — BOLIVIA: Chulumani, November 30, 1898, to January 5, 1899, 4 ♂, 8 ♀; twelve miles northeast of Coroico, May 20 and

24, 1899, 2 ♂; near Coroico, June 3, 1899, 1 ♂; all by W. J. Gerhard. Academy of Natural Sciences of Philadelphia.

The specific name is taken from that of a human tribe of the neighborhood.

#### 14. *Heliocharis amazona*.

(PLATE VIII, FIG. 139.)

*Heliocharis amazona* Selys, Syn. Calopt., p. 55, 1853; Monog. Calopt., p. 188, pl. 5, fig. 5 (wing), pl. 14, fig. 5 (apps. ♂), 1854; Bull. Acad. Belg. (2), xxvii, p. 661, 1869.

The type "♂ jeune" from Ega, on which were based the descriptions of 1853 and 1854, was stated to have "le dessus du thorax olivâtre," no mention being made of any dark markings. The description of 1869, of a male from Para, reads "Devant du thorax verdâtre avec une raie à la suture dorsale, une antéhumérale et une double humérale noirâtres." The present material has a very distinct narrow black stripe on the mid-dorsal thoracic carina, but any humeral or antehumeral markings are very indistinct and doubtful, although the sides and ventral surface of the thorax are partly pruinose.

The abdomen, of which very brief mention is made in the descriptions, is greenish at its base (segments 1 and 2), blue on the following segments, with these black or blackish-brown markings: the intersegmental articulations, a narrow mid-dorsal stripe reaching the entire length of each segment from 2-10, having a hastate form on 2-6, the anterior third of 10, a longitudinal lateral stripe on 2-10 as long as the segments, not confluent with the mid-dorsal stripe except at the intersegmental articulations and at the base of 10.

Anal vein (= postcostal of de Selys) separating from the hind margin (*i. e.*, wings ceasing to be petiolated) distinctly proximal to the level of the arculus and at, or proximal to, the level of the cubito-anal cross-vein.  $M_{1+2}$  (= principal sector of de Selys) separating from  $M_3$  (= median sector of de Selys) 2-2½ cells beyond the level of the distal end of the quadrilateral on the front wings, 1-1½ cells on the hind. Distance from base to nodus 14 (front wings), 12-12.5 (hind wings); from base to proximal end of stigma 26.5-27 (front), 24 (hind) mm. Quadrilateral with one cross-vein, except in one front wing and one hind wing. Median area (= basilar, Selys) with 1-4 (front wings), 2-3 (hind wings) cross-veins. One row of cells throughout the entire second cubital area (= espace postcostal, Selys). Two (in one front wing 3) basal subcostal cross-veins on all the wings.

Labium almost exactly as figured for *Dictérias atrosanguinea* (Monog. Calopt. pl. 8, fig. 12).

Abdomen 35–36 mm., hind wing 28.5–29 mm.

*Habitat.* — BRAZIL: Chapada, by H. H. Smith, 2 ♂, one numbered 26 by the collector. Carnegie Museum, Pittsburgh.

♀. Thorax as above described for the males but without any pruinosity. Abdomen evidently much faded, but apparently it was of a pale color without black stripes or markings. Abdominal segments 8 and 9 of nearly equal length dorsally, 10 half as long as 9 with a mid-dorsal carina for its entire length, hind margin entire. Appendages a little longer than 10, straight, simple, tapering, apices very acute. Genital valves reaching caudad almost to the level of the hind end of 11 (anal tubercle), their "palps" subequal in length to the mid-dorsum of 10.

Venation as described for the Chapada males except as follows: point of separation of  $M_{1+2}$  from  $M_3$  only one cell distal to the level of the distal end of the quadrilateral on the front wings, one cross-vein in the median area of all the wings, only one basal subcostal cross-vein on the wings of the left side, both front and hind.

Abdomen 33; hind wing, 29.5 mm.

*Habitat.* — BRAZIL: Rio Sapon, January 30, 1908, by J. D. Hase-man, 1 ♀. Carnegie Museum, Pittsburgh.

As will be seen from the above descriptions, these three specimens not only combine some features of *H. amazona* and of *H. libera* Selys, but also differ in some respects, *e. g.*, the extent of petiolation of the wing, from the characters laid down for the genus. So few specimens of *Heliocharis* have been examined, however, that we are not yet in a position to say which of the venational differences are individual variations and which represent more fundamental features.

#### 15. *Chalcopteryx rutilans* Rambur.

Prof. Needham has figured the venation of this brilliant species in the Proceedings of the United States National Museum, xxvi, p. 729, fig. 22, 1903.

*Habitat.* — BRAZIL: Apehu, State of Para, November 1, 1892 [by Schultz?], 1 ♂. Collection of P. P. Calvert ex. coll. Selys.

Chapada, by H. H. Smith, 1 ♂ and parts of eight others, No. 75. Carnegie Museum, Pittsburgh.

16. *Euthore fasciata inlactea* subsp. nov.

♂. Differs from *fasciata* type chiefly by the absence of all milky-white color from the wings, the specimens appearing to be fully mature.

Front wings with 24–26 antenodals, 31–32 postnodals, a dark brown band, the proximal edge of which is straight and nearly transverse to long axis of the wing, begins at the tenth or eleventh postnodal and ends at the level of the 25th to 28th postnodal, its distal edge less regular and more oblique and proximal to the stigma; this band reaches from the anterior to the posterior margin of the wing, narrowing a little posteriorly, its extent along  $M_2$  (= nodal sector, Selys) 6–6.5 mm.

Hind wings with a similar band, the distal edge of which is more oblique and reaches to the stigma, and narrows proportionally more than on the front wings.

Abdomen 35, hind wing 26.5 mm.

*Habitat*. — PERU: Piches and Perene Valleys, 2,000–3,000 feet, Soc. Geog. de Lima, 2 ♂. U. S. National Museum.

17. *Ortholestes clara* Calvert.

*Ortholestes clara* Calvert, Entom. News, ii, p. 199, 1891; Proc. Acad. Nat. Sci. Phila., 1893, p. 380, figs. 1, 2 (venation, apps. ♂); McLachlan, Ann. Mag. Nat. Hist. (6), xvi, p. 19, 1896.

This species was originally described from Jamaica, and the following species from Hayti. The late Mr. McLachlan recorded *O. clara* from Hayti, where we should have expected *O. abbotti*. His specimens came from Samana Bay; two of them, which he subsequently gave to me, are before me and I agree in his identification. There are also specimens from the same locality, by Frazar, in the Museum of Comparative Zoölogy, Cambridge, Mass.

18. *Ortholestes abbotti* Calvert.

*Ortholestes abbotti* Calvert, Proc. Acad. Nat. Sci. Phila., 1893, p. 382, fig. 3 (apps. ♂).

*Hypolestes trinitatis* Hagen, Proc. Bost. Soc. Nat. Hist., xi, p. 290, 1867 (no description).

*Habitat*. — CUBA: by Poey, 1865, 1 ♂ 1 ♀; numbered  $\frac{119}{33}$  and with the label "L. trinitatis" in de Selys' hand; 1 ♂ 1 ♀, numbered  $\frac{118}{32}$ . Museum of Comparative Zoölogy, Cambridge, Mass. Hagen (*l. c.*) quoted this species in his "Odonate-Fauna of the Island of

Cuba'' as from ''Near the town of Trinidad, also at Bayamo, in July and August.'' Mr. McLachlan (*l. c.*, p. 20) refers to this species as from the ''island of Trinidad,'' perhaps erroneously.

I can find no differences between these two females and that of *O. clara* from Jamaica.

The genus *Ortholestes* is, so far as known, confined to the West Indies.

#### 19. *Archilestes grandis* Rambur.

*Archilestes grandis* Calvert, Biol. Centr.-Amer. Neurop., pp. 46, 350, 1901, 1907.

*Habitat.* — COLOMBIA: Cacagualito in Dept. Magdalena, September, 1 ♂, November, 1 ♀, by H. H. Smith. Carnegie Museum, Pittsburgh.

#### GENUS LESTES.

De Selys grouped the Neotropical species of *Lestes* (excluding those continental forms found not farther south than Central America) as follows:<sup>9</sup>

Rear of the head bronze or blackish, inferior appendages of the male long.

*minutus* (Brazil), *sublatus* (Surinam).

Rear of the head yellow, inferior appendages of the male long.

*forficula* (Brazil), *striatus* (Venezuela), *spumarius* (Porto Rico).

Rear of the head yellow, inferior appendages of the male short.

*exoletus* (Brazil), *undulatus* (Chile), *auritus* (Brazil), *tricolor* (South America), *pictus* (Brazil), *tenuatus* (West Indies, etc.).

Of these eleven species I know but six, which, with six hitherto undescribed, may be grouped under a slight modification of de Selys' arrangement as follows:

Rear of the head chiefly dark-colored, inferior appendages of the male almost or quite as long as the superiors.

*scalaris* n. sp. (West Indies), *bipupillatus* n. sp. (Brazil).

Rear of the head chiefly pale-colored, inferior appendages of the male more than half as long as the superiors.

*forficula*, *spumarius*, *mediorufus* n. sp. (Brazil), *paulistus* n. sp. (Brazil).

Rear of the head chiefly pale-colored, inferior appendages of the male half, or less than half, as long as the superiors.

*pictus*, *tricolor*, *tenuatus*, *dichrostigma* n. sp. (Brazil), *undulatus*, *quadri-striatus* n. sp. (Brazil).

The objections to such an arrangement are that in some species the pale color of the rear of the head becomes dark with age and that no means of distinguishing the females of the second and third groups is afforded. With at least one-third of the South American species un-

<sup>9</sup> *Bull. Acad. Belg.* (2), xiii, pp. 298, 308, 310, 1862.



known to me, I do not care to undertake a revision of the neotropical members of this cosmopolitan genus, but I have given descriptions and figures of the pectoral color markings, which seem distinctive specifically, and which appear to be identical, or nearly so, in both sexes of the same species. These will aid greatly in the identifications, I hope, although they too have the disadvantage of being obscured in some cases by pruinosity in age.

20. *Lestes scalaris* sp. nov.

(PLATE I, FIGS. 6, 17, 18.)

*Lestes scalaris* Hagen, Proc. Bost. Soc. Nat. Hist., xi, p. 289, 1867 (no description).

♂ (*Young*). Dorsal surface of head metallic-green; a spot caudo-laterad to each lateral ocellus, frons, clypeus, labrum, and genæ pale brown; rear of head obscure, except around the occipital foramen, which with the labium is pale yellow.

Thorax pale yellowish-brown, each mesepisternum with a somewhat metallic bluish-brown stripe, attaining the anterior mesothoracic margin, gradually narrowing upward from .36 mm. near its lower end to .24 mm. at five-sevenths' length where it abruptly widens on its outer side to .5 mm., the outer edge thence continuing as a straight line, the inner (mesial) edge curving outward to meet it at an angle of  $45^{\circ}$ – $50^{\circ}$  and without quite reaching the antealar sinus; at mid-height this mesepisternal stripe is about .16 mm. distant from the mid-dorsal carina. Mesepimeron with an irregular bluish-brown stripe apparently composed of two elongated spots — the upper the longer — connected by a line. The markings of the pectus consist of an elongated dark brown metepimeral spot superior to the anterior end of the latero-ventral carina, a brown spot between the two branches of the posterior fork of the same carina, and the following brown metasternal markings: a streak parallel to the latero-ventral carina and lying posterior to the level of the anterior metepimeral spot, a pair of round spots near the hind end of the mid-ventral groove, and a median posterior spot.

Dorsum of abdominal segments brownish, with metallic-blue reflection, sides inferiorly paler, apical fifth or sixth of 3–7 forming a darker ring.

Superior abdominal appendages yellowish in the proximal half, darker distally. (For description of shape see next stage.)

Legs yellowish with indistinct darker lines. Pterostigma pale brown.

♂ (*Older*). Dorsal and posterior surfaces of head dark metallic-green passing into blackish-brown on frons and nasus; labrum, external surfaces of mandibles, and genæ below the level of the frons, pale blue; extreme free margin of labrum, lower surface of mandibles, labium, and borders of occipital foramen pale yellow.

Prothorax obscure, reddish. Thoracic dorsum reddish-brown, sides and pectus yellow, mesepisternal stripes as above, but dark metallic-green, mesepimeral stripe broken into the two spots, dark metallic-green; pectoral markings blackish as above, except that the pair of metasternal spots are elongated and fused anteriorly and extend forward as a blackish line into the mid-ventral groove.

Dorsum of abdominal segments darker, retaining the metallic-bluish reflection, except on the apical fifth or sixth, where it is replaced by metallic-green. A narrow, transverse, basal, mid-dorsally interrupted, pale ring on 3-7.

Superior abdominal appendages longer than 10, not as long as 9; blackish-brown, curved toward each other in their distal halves. In dorsal view the inner edge of each appendage bears at one-third the appendage-length an acute tooth directed caudad, followed by a lamina with an almost straight non-denticulated margin for about one-fifth of the length of the appendage, this lamina terminating almost at a right angle to the appendage and succeeded by a concavity, and this by a small (sometimes double) tooth at seven-tenths of the appendage-length, apex rounded. In profile view the proximal two-thirds are almost straight, the distal third curved downward.

Inferior appendages nine-tenths as long as the superiors, pale brown, almost straight, curved slightly toward each other, very slightly enlarged before the apex in dorsal view; in profile view the distal three-fifths much more slender than the proximal two-fifths.

Legs pale blue or yellow, femora with a superior and an inferior longitudinal black line, tibiæ with an inferior longitudinal black line, tarsi black. Pterostigma blackish brown.

♂ (*Oldest seen*). Generally blackish, except the blue and yellow parts of the head as described for the preceding stage, the pectus (which remains yellow, although the metasternal streaks near the latero-ventral carinæ are elongated anteriorly and unite with the black line filling the mid-ventral groove), the dorsum of abdominal segments 2-5, which show a metallic-green reflection throughout, the ventral margins of the tergites of 1-7 which are yellow, most of the inferior

surfaces of the femora and the superior surfaces of the tibiæ, which remain pale blue or yellow; some pruinosity on the prothorax, inferior parts of the mesepimeron and metapleuron, and on abdominal segments, 1, 8-10; the metallic-green mesepisternal and mesepimeral stripes are faintly visible amidst the surrounding black. Pterostigma almost black.

In all the above stages, the pterostigma surmounts two cells, its distal side is less oblique than the proximal; 8-10 postnodals on the front wings, 8-9 on the hind.

Abdomen 26.5-27; hind wing 17-18; costal edge of stigma, front wing, 1.1 mm.

♀ unknown.

*Habitat*.—CUBA: 1 ♂, probably by Poey, collector's number  $\frac{104}{29}$ , with label "L. scalaris" in de Selys' hand, the young stage above described; 1 ♂ by Gundlach, 1866, the older stage described, type of the species. Museum of Comparative Zoölogy.

PORTO RICO: Mayaguez, by O. W. Barrett, January, 1 ♂, oldest stage described. Collection of P. P. Calvert.

Hagen in his list of Cuban Odonata of 1867 (see *ante*, p. 93), writes "*Lestes scalaris* Hagen. July and August, flying over ponds."

## 21. *Lestes bipupillatus* sp. nov.

(PLATE I, FIG. 15; PLATE II, FIGS. 21, 22.)

♂. Metallic-green or bluish-green except the following: genæ below the level of the frons, rhinarium, labrum, external faces of the mandibles, sides inferiorly of abdominal segments 2-7,<sup>10</sup> a narrow, transverse, basal, mid-dorsally interrupted ring on 3-7,<sup>10</sup> a similar apical ring on 2-4 or 6,<sup>10</sup> *pale blue*; labium cream-colored; nasus and sterna of 3-7 black; rear of head, prothorax, a mid-dorsal thoracic stripe about .5 mm. wide, a mesepisternal stripe slightly narrower and immediately bordering the humeral suture, sides of thorax, pectus, abdominal segments 1, 8-10, blackish and pruinose; legs yellowish, femora with two longitudinal lines, tibiæ inferiorly and tarsi, black.

Superior appendages longer than 10, not as long as 9, black, curved toward each other in their posterior halves; in dorsal view, the inner margin of each bears an acute posteriorly-directed tooth in the first fourth, followed in the second fourth by a convexity, the edge of

<sup>10</sup> Some or all of these abdominal markings may be yellow.

which is very minutely denticulated, and a much less marked convexity in the third fourth, apex of the appendage rounded; in profile, the proximal two-thirds of the appendage is straight, the distal third slightly bent downward.

Inferior appendages black, as long as the superiors, in profile each is thick at the base, rapidly contracting to one-third length, whence the remainder is slender and almost straight until the distal fifth, which is curved upward toward the superior; in dorsal or ventral view the basal third is much wider than the remainder, which latter very gradually tapers distally, the extreme apex being very slightly enlarged and rounded.

Wings almost clear; stigma almost black, or dark brown surmounting two cells, or more, or slightly less, proximal and distal edges parallel, paler; 9-11 postnodals on the front wing, 8-10 on the hind.

♀. Differs from the male as follows: rear of the head in most of the examples obscure and more or less pruinose, but apparently originally yellow in young stages; prothorax pale brown with a central and a lateral (blue?) spot, later with a pair of metallic-green dorsal spots; thoracic dorsum pale brown, a metallic-green mesipisternal stripe attaining the anterior mesothoracic margin below and to, or not quite to, the antealar sinus above, slightly narrower in its middle, where it is about .25 mm. wide and distant from the mid-dorsal carina by its own width, nearer to the carina at its ends; sides of the thorax yellowish, especially below, a mesepimeral metallic-green stripe half as wide, or less, as the mesepisternal stripe, not reaching to the antealar sinus or the mesinfraepisternum; pectus yellowish, an elliptical black metepimeral spot on the superior side of the anterior end of the latero-ventral metathoracic carina; in one female all but the hind fourth of the mid-ventral metasternal groove is filled with a black stripe; abdominal segment 1, in earlier stages, apparently metallic-green on dorsum, its sides and a mid-dorsal basal spot yellow; 8-10 obscure dark brown, becoming pruinose later, their sides yellowish; abdominal appendages half as long as 10, brown becoming black; genital valves very minutely denticulated, their "palps" reaching back to the level of the tips of the appendages, or slightly less; 8-11 postnodals on the hind wing.

Abdomen ♂ 24-29, ♀ 23-27; hind wing ♂ 16-19, ♀ 16.5-19; costal edge of stigma, front wing ♂ ♀ 1.1-1.25 mm.

*Habitat.* — BRAZIL: Chapada, by H. H. Smith; 13 ♂ and parts of

12 others, 6 ♀ and parts of 3? others, collector's number 140; 4 ♂ and parts of 3 others, collector's number 86. Carnegie Museum, Pittsburgh.

All the males are more or less pruinose and consequently mature. One or two of them give hints, that, when immature, their coloring is nearly the same as that described above for the females.

The specific name proposed refers to the pectoral color-pattern.

## 22. *Lestes spumarius* Selys.

*Habitat.* — CUBA: 2 ♂; Museum of Comparative Zoölogy, Cambridge, Mass.

One of these males, numbered  $\frac{117}{31}$ , perhaps by Poey, bears a label "L. spumaria? ♀" in Selys' hand; it has 10 postnodals on all the wings and is smaller than the type.

## 23. *Lestes mediorufus* sp. nov.

(PLATE I, FIG. 10; PLATE II, FIGS. 23, 24.)

♂. *Younger.* — Dorsal surface of head dull blackish-brown; rhinarium, labrum, external faces of mandibles, genæ below level of frons, pale blue; labium and rear of head yellow.

Prothorax brownish above, pale green on each side.

Thorax pale greenish; a mid-dorsal reddish band about 1.0 mm. wide; a short black line on the upper end of the humeral suture; a reddish-brown stripe, of irregular width of .1–.2 mm., on the lower two-thirds of the mesepimeron; a black line on the upper third of the obsolete first lateral suture, terminating inferiorly in a round spot. Metapleuron lightly pruinose, except at the upper end of metepisternum; pectus yellowish, an anterior metepimeral black stripe, .6 mm. long, above the anterior end of the latero-ventral carina, and a wider metasternal black stripe, 1.2 mm. long, close to and parallel to the same carina, neither of these stripes confluent with each other, nor with their fellows of the opposite side.

Dorsum of abdominal segments 1–5 dark metallic-green, becoming brown on 6–10; a fine pale mid-dorsal line on 2–6 or 7, sides of 1–6 or 7 inferiorly, a narrow transverse basal mid-dorsally interrupted ring on 3–6 or 7, pale blue.

Superior appendages longer than 10, not as long as 9, curved toward each other in the apical third, pale brown, darker at the tips. In dorsal view, the inner edge of each bears at one-fifth length a back-

wardly-directed spine-like tooth followed after a slight interval<sup>11</sup> by a lamina, the free edge of which is concave and spinulose, and ends at about two-thirds the appendage-length in a second spine-like tooth, longer and more acute than that near the base, beyond which the appendage is moderately slender with a blunt apex; middle third of the outer edge of the appendage denticulate. In profile view the upper edge of the appendage is slightly concave, or almost straight, for the proximal two-thirds, curved downward for the apical third; the basal tooth and lamina of the inner margin are visible on the lower edge, apex truncated.

Inferior appendages in dorsal view reaching to the apex of the second, more acute tooth of the superiors; pale brown, abruptly narrowed on the inner edge at half-length; distal half as wide as proximal, of uniform width, or slightly enlarged in terminal fourth; apex rounded, with pale hairs. In profile view they rapidly taper to half length; distal half slender, directed upward.

Legs yellow, femora with a superior and an inferior longitudinal line, tibiae with an inferior longitudinal line and the tarsi blackish.

Wings almost clear, stigma surmounting two cells or a little more, brown to dark brown, proximal and distal edges parallel, paler; 10-14 postnodals on the front wings, 8-11 on the hind.

*Older.* — A blackish line bounding each side of the reddish mid-dorsal thoracic stripe, beginning one-third of the way from the anterior mesothoracic margin, and ending at five-sixths of the way; a narrow black stripe along each side of the mid-dorsal thoracic carina, but leaving the carina itself pale, mesepimeral stripe blackish. (Chapada, 1♂, abdomen 26.5; hind wing 16; costal edge of stigma, front wing, 1.2 mm.)

*Oldest stage seen.* — Prothorax blackish dorsally, with a pair of arcuate pale green stripes on the middle lobe, front lobe pruinose; each of the blackish lines bounding the reddish mid-dorsal stripe of the preceding stage widened to a stripe .3 mm. wide at mid-height, where it is distant from the mid-dorsal carina by nearly .2 mm., not reaching the anterior mesothoracic margin below, nor the antearlar sinus above; area between the two black stripes more greenish than reddish; black mesepimeral stripe continued down upon the mesinfraepisternum, metasternal black stripe widened so as to reach almost

<sup>11</sup> In one male referable to this stage there is no interval and the basal tooth appears to be fused with and forms the beginning of the lamina.

to the mid-ventral groove (S. Paulo, 1 ♂, abdomen 26, hind wing 17; costal edge of stigma, front wing, 1.25 mm.).

♀. Colored like the younger males described above, except as follows: No black lines on the upper ends of the humeral and first lateral sutures, dorsum of abdominal segments 1-10 pale brown, sides of 1-10 inferiorly and a narrow transverse basal ring on 3-7 pale green or blue. Abdominal appendages not quite as long as 10, straight, tapering, pale yellow. Genital valves minutely denticulated, their "palps" reaching backward nearly to the level of the apices of the appendages.

Dimensions of the younger males and the female: Abdomen ♂ 28.5-29.5, ♀ 28; hind wing ♂ 18-19, ♀ 19; costal edge of stigma, front wing, 1.4 mm.

*Habitat.* — BRAZIL: São Paulo, September 14, 1900, by A. Hempel, 5 ♂, 1 ♀, collector's number 302. Academy of Natural Sciences of Philadelphia. (Type.)

Chapada by H. H. Smith, 1 ♂, no number. Carnegie Museum, Pittsburgh.

Four of the São Paulo males are those above described as "younger." It will be noted that they are larger than the fifth (oldest) male from the same locality and the Chapada male.

#### 24. *Lestes paulistus* sp. nov.

(PLATE I, FIG. 14; PLATE II, FIGS. 25, 26.)

♂. Dorsal surface of head blackish-brown, a triangular pale blue spot postero-laterad to each lateral ocellus, frons and nasus slate-colored; rhinarium, labrum, external faces of mandibles and genæ below the level of the frons pale blue; labium and rear of head cream-colored.

Prothorax blue, a longitudinal blackish stripe on each side. Thorax pale bluish. Each mesepisternum with a metallic-green stripe 1.5 mm. wide in its lower half, above which it becomes a mere line, again enlarging on its outer (lateral) side in the upper third of the sclerite into a large spot, .5 mm. in width, not reaching the antealar sinus; in its lower half this stripe is distant from the mid-dorsal carina by .3 mm., near its upper end by .2 mm. A blackish line on the upper end of the humeral suture. Mesepimeron with two elongated blackish spots having some metallic-green reflection, one above the other, the upper larger. Pectus somewhat pruinose; a slightly elongated black anterior metepimeral spot on the anterior end of the latero-ventral

carina, and a pair of small round metasternal spots near the hind end of the mid-ventral groove.

Dorsum of abdominal segments 2-4 dark metallic-green, of 5-10 blackish-brown, 9 pruinose; most of 1 (except a basal dorsal metallic-green spot), sides of 2-7 inferiorly, a narrow transverse basal ring on 3-6, and a fine mid-dorsal longitudinal line on 2-4, pale blue.

Superior abdominal appendages longer than 10, not as long as 9, curved toward each other in their apical halves, black. In dorsal view the inner margin bears an acute tooth, directed caudad, at one-fourth length, followed by a distinct interval, beyond which the inner margin again enlarges into a lamina with a straight minutely denticulated edge terminating without any distinct tooth where the appendage contracts to its narrower terminal two-fifths, apex truncated and rounded. In profile view the appendage is nearly straight in its proximal two-thirds, curved downward in its distal third.

Inferior appendages paler brown; in dorsal or ventral view barely reaching to the hind end of the lamina of the superiors; abruptly narrowed on the inner (mesial) side of each; distal half half as wide as the proximal half, of uniform width, moderately hairy. In profile view the inferiors taper less rapidly than in some of the other species here described, so that the contrast between proximal and distal halves is less marked.

Legs pale yellowish, femora with two superior and inferior longitudinal dark lines, tibiae inferiorly and tarsi black.

Wings almost clear, stigma surmounting two cells or less, with a paler line just inside the margins (except the posterior), proximal and distal edges almost parallel, 10-11 postnodals on the front wing, 9 on the hind. Dimensions of the type: abdomen 28.5; hind wing 18; costal edge of stigma, front wing, 1 mm.

*Variations.* — A Cuyabá male lacks the pale blue spots near the lateral ocelli, frons and nasus darker, some metallic-green reflection on the top of the head; rear of the head, much of the prothorax, and of the under parts of the thorax pruinose.

In all of the three specimens other than the type, the metallic-green mesepisternal stripe, instead of contracting into a line just above its middle, remains nearly as wide as in its lower half, but widens at its upper end to the dimension above given; it remains at the same distance from the mid-dorsal carina, but tends to become margined with black in the oldest male at hand (that from Cuyabá the head of which is de-



scribed above); the upper of the two mesepimeral spots is pronouncedly metallic-green and longer, its upper end reaching to the humeral suture, although not quite attaining the antealar sinus (connected with the lower mesepimeral spot in the oldest male from Cuyabá); metallic-green of the abdominal dorsum reaching back to segment 7 so far as the abdomen is present, 8 also showing some pruinosity, transverse basal ring present also on 7; 8-10 postnodals on the front wing, 9-10 on the hind; abdomen 27 mm.; hind wing 17-18 mm.

*Habitat.* — BRAZIL: São Paulo, September 14, 1900, by A. Hempel, 1 ♂, no number (type). Academy of Natural Sciences of Philadelphia.

Cachoeira, by H. H. Smith, 1 ♂, collector's number 39, lacks the head. Carnegie Museum, Pittsburgh.

Cuyabá, by H. H. Smith, 2 ♂, no number, one lacking the abdomen, the other lacking the head and abdominal segments 7-10. Carnegie Museum, Pittsburgh.

## 25. *Lestes pictus* Hagen.

(PLATE I, FIG. 11; PLATE II, FIGS. 27, 28.)

*Lestes picta* Hagen, Bull. Acad. Roy. Belg. (2), xiii, p. 314, 1862.

The supposed types of Hagen are before me, although the abdomen of the male measures 36 instead of 34 mm. The "raie humérale orangée" is strictly mesepimeral and in the female, as in the male, is "suivie d'un espace brun jusqu'à la première suture latérale." The pectus may have been bluish or yellowish; there is an elongated isolated metepimeral black spot on the anterior end of the latero-ventral carina, and a smaller blackish metasternal spot farther posterior and close to the carina; mid-ventral groove black.

A female from Chapada may belong to this species; the differences from the type female which it shows are at least too slight to refer it to another species in the absence of any male with which it might be conspecific. A comparison of the type female follows, the parentheses enclosing statements concerning the type: abdomen 30 (32) mm.; hind wing 22 (23) mm.; costal edge of stigma front wing 1.3 (1.5) mm.; width of head 3.4 (3.7) mm.; maximum width of thorax 2.7 (3.0) mm.; sides of the thorax pale bluish (yellow); dorsum of abdominal segments 2-6 dark brown without metallic-green reflection (darker, with a slight metallic-green reflection); 10-11 (12-13) postnodals on the front wings, 10 (12) on the hind.

In both females the blackish mesepisternal stripe — the "raie noire

presque contre la raie bleue juxta-humérale'' of the original description — is of almost equal width at mid-height, .28 mm. in the type; .24 mm. in that from Chapada, and is situated at the same distance from the mid-dorsal carina, *i. e.*, .4 mm. at mid-height; abdominal segments 8–10 brown with a mid-dorsal longitudinal green (not "brune") stripe; the sides of 8 for the entire length of the segment and the middle two-fourths of the sides of 9, pale green.

*Habitat.* — BRAZIL: no definite locality, 1 ♂, 1 ♀ each with two labels in Hagen's handwriting "Brazil Fischer" and "L. picta." Museum of Comparative Zoölogy, Cambridge. Presumed types.

Chapada, by H. H. Smith, 1 ♀, collector's number 9. Carnegie Museum, Pittsburgh.

## 26. *Lestes tricolor* Erichson.

(PLATE I, FIG. 9; PLATE II, FIGS. 29, 30.)

*Habitat.* — BRAZIL: Bahia [?] 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

## 27. *Lestes tenuatus* Rambur.

(PLATE I, FIG. 12.)

*Lestes tenuatus* Calvert, Biol. Centr.-Amer. Neurop., pp. 48, 50, 352, 1901, 1907.

*Habitat.* — COLOMBIA: Don Diego in Dept. Magdalena, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

## 28. *Lestes dichrostigma* sp. nov.

(PLATE I, FIG. 8; PLATE II, FIGS. 31, 32.)

♂. Upper surface of head dull brownish, rhinarium, labrum, outer faces of mandibles, genæ below the level of the frons pale blue; rear of head and labium yellow.

Prothorax violaceous, yellowish on each side of the middle lobe.

Thoracic dorsum violaceous, each mesepisternum with a slender metallic-green stripe .1–.2 mm. wide at mid-height, slightly wider above where it does not quite reach the antealar sinus, attaining the anterior mesothoracic margin below, parallel to and distant from the mid-dorsal carina by two to three times its own width. Mesepimeron pale violaceous-brown having on the posterior margin a dark brown stripe showing some metallic-green reflection, .3 mm. wide, not reaching antealar sinus, or mesinfraepisternum, this last with a dark brown spot. Sides and sternum of metathorax pale yellow, perhaps tending to pale bluish in life, upper end of metepisternum dark, blackish in older ex-

amples, the dark color extending farther down on the anterior and posterior margins than on the disk; a black anterior metepimeral stripe uniting with its fellow of the opposite side on the mid-ventral line; a black metasternal stripe, 1.25 mm. long, parallel to and almost contiguous with each latero-ventral carina, reaching farther forward and backward than the level of the hind end of the black metepimeral stripe, but not confluent with it. Mid-ventral thoracic groove blackish, especially between the bases of the legs, and a small elongated black metasternal spot on each side of its hind end.

Dorsum of abdominal segments 1-7 bronzy brown; basal dorsal portion of 1, a fine mid-dorsal longitudinal line on 2-4, a narrow transverse basal ring on 3-7 (usually interrupted mid-dorsally), a similar narrower apical ring on 3-6, sides of 1-6 or 7 inferiorly (except on the posterior sixth of 3-6) yellowish. Dorsum of 8-10 obscure, sides paler. Segment 7 different from all the others in having a coat of pale hairs reaching from one-fourth to five-sixths of the length of the segment, chiefly on the dorsal side, the hairs being one-third to one-half as long as the segment is thick.

Superior abdominal appendages twice as long as 10, longer than 9, not as long as 8, straight in the proximal half or three-fifths, curved toward each other and overlapping in the remaining half or two-fifths. In dorsal view there is on the inner edge a large blunt triangular tooth occupying the proximal half of the appendage, proximal edge of the tooth a little shorter than the distal edge, the latter terminating in a small prominence, which at its hind end forms almost a right angle with the appendage; the remainder of the appendage at first slender, then enlarging slightly, denticulated externally, and terminating in a rounded somewhat hairy apex. In profile view the upper margin in the proximal three-fifths is almost straight, distal two-fifths bent downward, tooth of the basal half forming a pronounced inferior convexity followed by a tubercle with very little interval between; at about four-fifths the appendage-length is an elongated inferior tubercle.

Inferior appendages about one-third as long as the superiors, reaching to slightly beyond the level of the apex of their basal tooth, abruptly narrowed on the inner edge at half their own length, basal half three to four times wider than the apical half, which latter is inclined toward its fellow of the opposite side, but not enlarged at tip. In profile view the inferiors taper rapidly to half their length, apical half very slender, straight.

Legs yellow, femora with two dark longitudinal lines, one inferior, the other superior, a dark inferior line on the first and second tibiæ.

Wings almost clear, stigma surmounting two cells, distal edge slightly more oblique than the proximal edge, in younger examples bicolored — brown with the distal third obliquely yellowish — in older individuals entirely brown; 10-13 postnodals on the front wings, 9-12 on the hind.

♀. Differs from the male as follows: no coat of long pale hairs on 7; 8-10 pale yellow or green; a brown stripe on each side of dorsum, this stripe extending down on the sides at the apex of 9 and of 10; a darker inferior line on the third tibiæ also; abdominal appendages not quite as long as 10 is dorsally, yellowish at base, brownish beyond, straight; margin of genital valve minutely denticulated, "palp" reaching almost to level of tips of abdominal appendages; pterostigma bicolored, as described above for younger males.

Abdomen: ♂ 35-36.5, ♀ 31-34; hind wing: ♂ ♀ 21-21.5; costal edge of stigma, front wing, ♂ ♀ 1.4 mm.

*Habitat.* — BRAZIL: São Paulo, September 14, 1900, 4 ♂, 2 ♀, by A. Hempel, collector's number 301, Academy of Natural Sciences of Philadelphia (type).

Chapada, by H. H. Smith, 1 ♂ No. 183. Carnegie Museum, Pittsburgh.

The Chapada male is much discolored, but the appendages and the pectoral pattern leave no doubt of its belonging to this species.

### 29. *Lestes undulatus* Say.

(PLATE I, FIG. 16; PLATE II, FIGS. 33, 34.)

*Habitat.* — BRAZIL: Rio Grande do Sul, by H. H. Smith, 1 ♂ (segments 7-10 lacking). Carnegie Museum, Pittsburgh.

URUGUAY: Montevideo, 1 ♀ ex Mus. Berol., Museum of Comparative Zoölogy, Cambridge, Mass.

CHILE: Baños de Cauquenes, C. E. Reed, 1 ♀. U. S. National Museum. Penco, 7 ♂ 8 ♀, Tolca, 1 ♂ 1 ♀, Concepcion, 1 ♂ 2 ♀, Lota, all in January, 1905, by C. E. Reed. Academy of Natural Sciences of Philadelphia.

### 30. *Lestes quadristriatus*, sp. nov.

(PLATE I, FIG. 13; PLATE II, FIGS. 35, 36.)

♂. Vertex, frons, and nasus blackish-brown; rhinarium, genæ below the level of the frons, labrum, and external faces of the mandibles

pale bluish-green; labium cream-colored; rear of the head mostly pale, but somewhat discolored.

Anterior prothoracic lobe and sides of the median lobe bluish; median lobe reddish dorsally with some dark central markings.

Thoracic dorsum faded, probably bluish in life; on each side of the mid-dorsal carina is a straight, dark, bronze-green stripe about .3 mm. wide at mid-height, narrower at its lower or anterior end, which attains the anterior mesothoracic margin, its upper end not quite reaching the antealar sinus. Each of these stripes is parallel to the mid-dorsal carina, and distant from it at mid-height by about half its own width. Sides of the thorax and pectus pale bluish; along the posterior margin of the mesepimeron is a black, slightly wavy stripe, slightly wider than the bronze-green mesepisternal stripe above described, not reaching to the wing-base above nor to the mesinfraepisternum below. Lower end of the mesepimeron and corresponding part of mesinfraepisternum brownish, becoming black in part on the last-named sclerite. The following marks on the pectus are black: the mid-ventral metasternal suture, an oblique anterior metepimeral line, which unites, or almost unites, anteriorly with the mid-ventral suture, and a metasternal stripe on each side, parallel and close to the lateral carina, unconnected with, and not reaching as far forward as, the preceding oblique line.

Abdominal segment 1 pale green; dorsum of 2-8 blackish-bronze, which extends down on the sides in the posterior half of 2, posterior sixth of 3-5, or more of 6-8; remainder of the sides of 2-8, a narrow, transverse, basal, mid-dorsally interrupted ring on 3-5 or 6, a mid-dorsal longitudinal line or stripe on 2, pale green; 9 and 10 obscure, pruinose.

Superior abdominal appendages longer than 10, not quite as long as 9, brown at base, darker in their remaining four-fifths; in dorsal view curved toward each other in the apical third; on the inner lower margin of each, in the second fifth of the appendage length is a rounded tooth, or convex projection, followed by a very short, nearly straight edge, succeeded by a second convexity, shorter and less pronounced than the first, and bearing about four acute denticulations and terminating at nearly two-thirds of the appendage length; in profile the two convexities above described are also visible while the apex is bent downward so strongly as to form almost a right angle with the superior margin, the extreme inferior tip being moderately acute. Inferior appendages lost.

Legs pale; femora superiorly with two longitudinal dark stripes; tibiae inferiorly, and most of the tarsi dark.

Wings slightly cloudy, stigma almost black, surmounting two cells (or slightly more or less), distal edge more oblique than the proximal, 12-14 postnodals on the front wings, 12 on the hind.

♀. Differs from the male as follows: rear of head distinctly yellow; bronze-green mesepisternal stripe only one-third as wide as that of the ♂ and separated from the mid-dorsal carina by a greater interval, *i. e.*, twice its own width; sides of the thorax and pectus more yellowish; black mesepimeral stripe shorter (half, or less than half, as long as the sclerite) and narrower (half, or less than half, as wide as the sclerite); black absent from the mesinfraepisternum in one ♀; less blackish-bronze on abdominal segments 2-5 in that it does not extend on the sides before the apex of each (segments 6-10 lost); 11-14 postnodals on the front wing, 10-12 on the hind.

Abdomen ♂ 34 mm. (segs. 1-5, 20 mm.), ♀ (segs. 1-5, 19 mm.); hind wing ♂ 20, ♀ 20.5-22 mm.; costal edge of stigma, front wing, 1.3-1.5 mm.

*Habitat.* — BRAZIL: Chapada, by H. H. Smith. The type, a male, collector's number 141, has lost the head. One male and two females, collector's number 84, have lost abdominal segments 6-10 or 2-10 (1 ♀) but appear to be of the same species. All four specimens in the Carnegie Museum, Pittsburgh.

### 31. *Mecistogaster ornatus* Rambur.

*Mecistogaster ornatus* Calvert, Biol. Centr.-Amer. Neurop., pp. 55, 353, 1901, 1907.

*Habitat.* — COLOMBIA: Don Diego, 2 ♀; Bonda, July, 1 ♀, September, 1 ♀, November, 1 ♀, December, 1 ♀; Don Amo, November, 1 ♂; Onaca, December, 2 ♂, 1 ♀; Valparaiso, December, 1 ♂; all in Dept. Magdalena, by H. H. Smith. Carnegie Museum, Pittsburgh.

These localities give a vertical distribution for this species of from 100 to 4,500 feet.

### 32. *Mecistogaster amalia* Burmeister.

*Mecistogaster amalia*, Calvert, Biol. Centr.-Amer. Neurop., p. 354, 1907.

*Habitat.* — BRAZIL: Rio de Janeiro, by H. H. Smith, November, 1 ♀, December, 1 ♀. Carnegie Museum, Pittsburgh.

PARAGUAY: Sapucay, by W. T. Foster, January, 1900 and 1901,

1 ♂ 3 ♀, February, 1900, 3 ♂, March, 1900, 6 ♂. U. S. National Museum.

### 33. *Megapodagrion setigerum*.

*Megapodagrion setigerum* Selys, Mem. Couron. Acad. Belg., xxxviii, p. 42, 1886.

A male from Chulumani in Bolivia, taken January 5, 1899, by W. J. Gerhard (Academy of Natural Sciences of Philadelphia) is smaller than the types from Intaj, Ecuador, having the abdomen 30 mm., hind wing 24.5 mm.; there is a supplementary sector between  $M_2$  and  $R_s$  (nodal and subnodal sectors), not between  $R_s$  and  $M_3$  (subnodal and median sectors) as the description has it: in this respect this male agrees with *M. nebulosum* Selys, if there has been no error in the description of *setigerum*. Nineteen postnodals on the front wings. Head marked as in *M. nebulosum*. Those parts of the prothorax and thorax, described as "jaunâtre pâle" in *setigerum*, are pale blue; dorsum of abdominal segment 1 pale blue, its sides as well as those of 2-4 inferiorly pale yellow.

### 34. *Megapodagrion nebulosum* Selys.

*Habitat*. — PERU: Piches and Perenes valleys, 2,000-3,000 feet, Soc. Geog. de Lima, 1 ♂. U. S. National Museum.

BOLIVIA: Chulumani, January 5, 1899, 1 ♂; near Coroico, June 3, 1899, 1 ♂; both by W. J. Gerhard. Academy of Natural Sciences of Philadelphia.

The male from near Coroico has the abdomen 33 mm. long, hind wing 27 mm., 19-20 postnodals on the front wing. The corresponding figures for the Chulumani male are 31, 25, 16-18, and for that from Peru, ?, 26, 17-18.

## Genus HETERAGRION.

- i. *Males with the inferior abdominal appendages small, but distinctly developed.*

### 35. *Heteragrion æquatoriale*.

(PLATE III, FIG. 37.)

*Heteragrion æquatoriale* Selys, Mem. Couron. Acad. Belg., xxxviii, p. 63, 1886.

*Habitat* — PERU: Piches and Perene valleys, 2,000-3,000 feet, 1 ♂, 1 ♀, from Soc. Geog. de Lima. U. S. National Museum.

♂. This male is very large. Even without the second segment (which has been lost) the abdomen measures 48 mm. in length, the hind wing 29 mm., so that the latter organs *would* "atteignent le 6e segment";

there is but one entire cell and a small part of another between the quadrilateral and the level of the vein descending from the nodus on the left hind wing; the stigma surmounts the equivalent of two cells on the left wings, the front wings have 18 postnodals, the maximum width of the hind wings is 4 mm. De Selys' description of the thorax would appear to be slightly incorrect, as "seconde suture latérale" is the same as the "suture latérale médiane" and ought probably to have been "première suture latérale"; so altered, the present male agrees with the description; the tooth of the superior appendages is not as acute as in *H. majus*.

♀. The specimen is teneral, pterostigma pale yellow, surmounting the equivalent of two cells or more, maximum width of hind wings 5 mm.; abdominal segments 4-6 are lost, genital valves 1 mm. long, exclusive of the "palps": hind wing 30.5 mm.

### 36. *Heteragrion angustipenne* Selys.

(PLATE III, FIGS. 42, 43.)

*Heteragrion angustipenne* Selys, Mem. Couron. Acad. Belg., xxxviii, p. 64, 1886.

*Habitat.* — PERU: Cumbase, 1 ♂. Collection of P. P. Calvert *ex coll.* R. Martin.

Smaller than the type, abdomen 42, hind wing 24.5 mm., maximum width of front or hind wing 3.2 mm.; 16 postnodals on the front wing; otherwise agreeing well with the description, which does not include the last three segments or the appendages, wherefore the following: 8 pale yellow, some brown on each side at base; 9 and 10 blackish-brown on dorsum, sides inferiorly and ventral surface pale (yellowish?). Superior appendages twice as long as 10, as long as 9, blackish, almost identical in shape with those of *H. inca*, n. sp. (*q. v.*). Inferior appendages very small, pale throughout, their slender apices directed upward.

### 37. *Heteragrion inca* sp. nov.

(PLATE III, FIG. 38.)

♂. Dorsal surface of the head black from the median ocellus back to the posterior margin, frons and nasus golden yellow; first two antennal joints, genæ, lips, and rear of head pale yellow, but not golden; an elongate black spot between each antenna-base and the adjoining eye.



Prothorax obscure yellowish with a mid-dorsal longitudinal black stripe expanding on the hind lobe, but leaving the margins yellow.

Remainder of thorax pale (blue?), but with blackish-brown predominating on the dorsum, so that there remains of the pale color only a narrow line (bordering the .4-.5 mm. wide mid-dorsal brown stripe on each side, and in front of the antealar sinus) and the posterior mesepisternal margin to a width of .3 mm. Mesepimeron and metepisternum each with an ill-defined median brownish stripe from the level of the metastigma upward.

Abdominal segment 1 pale (yellow?), dorsum of 2-7 blackish-brown, 2-5 with a fine mid-dorsal longitudinal yellow line, 3-7 with a transverse basal yellow ring and the posterior sixth with a transverse black ring; the blackish-brown of the dorsum of 4-7 extends farther down on the sides in the second and third sixths of the length of those segments than in the fourth and fifth sixths, indeed completely encircles these segments in the second sixth, so that in ventral view each of segments 4-7 show two yellow and two brown transverse areas alternating to make four in all; 8 pale yellow with a mid-dorsal longitudinal blackish band narrowing posteriorly to a line at the hind end; 9 and 10 with the dorsum blackish-brown, sides and under surface yellow.

Superior abdominal appendages twice as long as 10, not so long as 9, forcipate, base not swollen, inner margin with a slight and gradual convexity at one-fourth length and a tooth at three-fifths length, apex of tooth angular, not rounded, but not acute; upper surface of the appendage with a slight obliquely-transverse ridge above this tooth, and with a longitudinal groove distal to this ridge almost to the blunt and rounded apex of the appendage; outer margin of the appendage with 6-7 spines in the distal half; outer margins of the appendages blackish, inner margins pale brown.

Inferior appendages pale yellow, extremely short, their slender acute apices directed upward.

Legs obscure (bluish?) with two dark transverse bands on the femora and the inferior surfaces of the tibiæ blackish.

Wings with the cubito-anal cross-vein (= basal postcostal of de Selys) proximal to the level of the arculus by a distance subequal to the total length of the arculus, anal vein (here = inferior sector of the triangle of de Selys) separating from the hind margin of the wing between the levels of the cubito-anal cross-vein and arculus, two ante-

nodal cells distal to the quadrilateral ; stigma dark brown with a pale marginal line just within the enclosing veins, surmounting more than two cells or their equivalent ; front wings with 18-19 postnodals, hind-wings with 16 postnodals.

♀. Differs from the male as follows : Dorsal surface of the head pale reddish-brown, a transverse black stripe on the posterior margin ; a transverse black line beginning behind each lateral ocellus, running toward the eye but forking before reaching it ; the elongate black spot between each antenna-base and the adjoining eye described for the male is present, but larger, and in the same transverse line with these spots is a transverse black stripe between the two antennæ, the three thus forming a transverse black stripe from eye to eye in front of the median ocellus, but interrupted by each antenna ; frons, nasus, genæ, lips, and rear of head yellow, free margin of, and a mid-basal spot on, the nasus black ; mid-dorsal longitudinal black stripe absent from the prothorax, but the spot on the hind lobe almost as large as in the male ; remainder of thorax perhaps pale yellow instead of blue ; dorsum marked as in the male, but with a paler brown ; mesepimeral and metepisternal brown stripes on the contrary darker and more sharply defined than in the male ; brown on the abdominal dorsum paler, posterior sixth of 6 barely and of 7 not at all darker than the remainder of those segments ; 8 with merely a mid-dorsal longitudinal black line ; no dark markings on 9 and 10 ; abdominal appendages longer than 10, half as long as 9, reddish, black at the acute tip ; genital valves reaching so far backward as to slightly exceed the level of the apices of the appendages, their inferior margin minutely denticulate ; legs pale yellow, femora with a darker superior and a darker inferior longitudinal line or stripe, inferior surfaces of tibiæ darker ; wings slightly smoky, distinctly wider, 17 postnodals on the hind pair.

Abdomen ♂ 37, ♀ 35.5 ; hind wing ♂ 23, ♀ 25.5, its maximum width ♂ 3.7, ♀ 5 ; costal edge of stigma, front wing, ♂ 1.1, ♀ 1.3, posterior edge of same ♂ 1.6, ♀ 1.8 mm. Genital valves, ♀ 3 mm. long.

*Habitat.* — PERU : Iquitos, Staudinger, 1 ♂, 1 ♀. Museum of Comparative Zoölogy.

This pair closely resemble the descriptions of *H. icterops* Selys, but differ therefrom in the longer abdomen of the male (*icterops* 32 mm.), pterostigma surmounting more than two cells (less than two cells in *icterops*), in having no black between the antennæ in the male (in

*icterops* male: "entre lesquelles [antennes] le noir du dessus de la tête dessine, devant les ocelles, une double échancrure"), inferior appendages of the male entirely yellow (in *icterops*, "finissant subitement en pointe noire").

From the descriptions of *H. æquatoriale* Selys and *H. angustipenne* Selys, this pair differ by the shorter abdomen of the male, tooth of the superior appendages not acute (acute in *æquatoriale*, not in *angustipenne*), black of the upper surface of the head of the male not advancing to the upper surface of the frons (as it does in *angustipenne*, although not in *æquatoriale*).

The length of the genital valves of the female appears to be unusual in this genus. Hagen had given the manuscript name of *inca* to this species, but published no description, and this name has already been employed in an anatomical paper (Higgins, Proc. Acad. Nat. Sci. Phila., 1901, p. 137, pl. III, fig. 18) when referring to material obtained from the types here and now described (not 2 ♂ as stated, *l. c.*).

### 38. *Heteragrion flavidorsum* sp. nov.

(PLATE III, FIG. 41.)

♂. Differs from *H. inca* n. sp. (*q. v.*), as follows: hind lobe of prothorax entirely black; pale color of the thorax yellow, the narrow yellow line bordering each side of the mid-dorsal black stripe has disappeared, except at its upper end and in front of the antealar sinus; dorsum of abdominal segment 1 chiefly blackish-brown, the fine mid-dorsal longitudinal yellow line on 3-5 or 6 has expanded on the anterior five-sixths of 3 and on the second to fifth sixths of 4-5 or 6 into a dorsal yellow stripe of almost the full width of the segments, which stripe is bounded laterally by a blackish-brown line, thus separating the dorsal yellow from the ventral yellow; transverse basal yellow rings of 3-7 obscure, apparently interrupted by black mid-dorsally; ventral surface of 7 brown throughout; mid-dorsal longitudinal blackish stripe on 8 confined to the anterior half of the segment; superior appendages as long as 9, tooth on the inner margin situated at two-thirds of the appendage-length; apices of inferior appendages blackish; legs brown, femora yellow inferiorly, tibiæ and tarsi blackish; 17-18 postnodals on the front wing, 16-17 on the hind.

Abdomen 40.5; hind wing 24.5, its maximum width 4.0; costal edge of stigma, front wing, .9, posterior edge of same 1.3 mm.

*Habitat.*—BOLIVIA: Nine miles from Coroico, May 19, 1899, by W. J. Gerhart, 1 ♂. Academy of Natural Sciences of Philadelphia.

Of the differences given above from *H. inca* those due to an increased area of black might conceivably be the results of age, but no such explanation will account for the wide dorsal yellow stripes of 3-5 or 6.

I had first identified this male as *H. æquatoriale*, but neither the description of that species, nor the male which is referred to it on page 107, give any indications of the lateral blackish line on segments 3-5 or 6 which separates the dorsal yellow from the ventral yellow of those segments; the tooth on the inner margin of the male of *H. inca* is much less acute than in *H. æquatoriale*. Both of these differences may be bridged over when a larger series of specimens is available.

ii. *Males with the inferior abdominal appendages undeveloped.*

### 39. *Heteragrion triangulare* Hagen.

(PLATE III, FIG. 39.)

*Heteragrion triangulare* Hagen, Bull. Acad. Roy. Belg. (2), XIV, p. 32, 1862; Selys, Mem. Couron, Acad. Belg. xxxviii, p. 58, 1886.

A complete male of this species has never been described, and de Selys was uncertain whether the imperfect male which he referred here in 1886 belonged to the species of 1862 or not. A description of specimens which seem to be conspecific with the type female follows.

♂. Pale reddish-brown with the following blackish markings: a band on the labrum (leaving the free margin and a short streak on each side pale; in the youngest male only a central round spot is blackish), the nasus, most of the upper surface of the head from and including the first antennal joint back to the posterior margin (leaving pale-colored a stripe running from each lateral ocellus forward and outward to the eye of the same side, and a shorter transverse isolated streak each side a little posterior to the level of each lateral ocellus much nearer to the eye than to the ocellus), a narrow median perpendicular stripe on the anterior surface of the frons connecting the black of the nasus with the black of the upper surface of the head, front lobe of the prothorax (except for two minute dots), a band in the mid-dorsal groove of the middle lobe confluent with a transversely elongated elliptical spot on the middle of the hind lobe, a mid-dorsal thoracic stripe .4 mm. wide at mid-height, a mesepisternal stripe almost as wide at its upper end as the sclerite but abruptly narrowed on its outer (lateral) side [at nearly mid-height to half its former width (this mesepisternal black stripe is completely separated from the black an-

tealer sinus and mid-dorsal stripe by a pale yellowish line, but is confluent at its lower end with some black on the anterior mesothoracic margin with which the mid-dorsal stripe is also confluent), a mesepimeral stripe not reaching the wing-base above, widening inferiorly, subequal in width to the pale area separating it from the black mesepisternal stripe, faint traces of markings on the upper ends of metepisternum and metepimeron, a short oblique streak just above the metastigma in the oldest male, a small bilobed dorsal spot on abdominal segment 1, some indistinct marks on each side of the dorsum of 2, a terminal transverse ring on the posterior sixth of 3-6, the posterior margin of 10, the superior abdominal appendages, a superior and an inferior longitudinal stripe on the femora, the inferior surface of the tibiæ and much of that of the tarsi. Abdominal segments 3-7 have a transverse basal yellow ring between which and the terminal blackish ring (on 3-6) most of the segments are brown dorsally, except for a fine mid-dorsal longitudinal yellow line, although this brown is much paler in the fourth and fifth sixths of 4-6 than in the basal halves of those segments; most of 7 is brown, paler posteriorly, 8-10 brownish-yellow.

Superior abdominal appendages not as long as 9, twice as long as 10, forcipate, apex obtusely rounded, basal fourth swollen, especially inferiorly, but also superiorly and interiorly, inner margin at half-length with a stout tooth obliquely truncated at tip, visible both in dorsal and in profile views, outer margin in the apical third with four spines. Inferior appendages undeveloped.

Pterostigma of the usual shape, dark brown, surmounting two cells or more. Front wings with 18-22 postnodals, 3 ( $62\frac{1}{2}$  per cent.) or 2 ( $37\frac{1}{2}$  per cent.) antenodal cells distal to the quadrilateral. Hind wings with 16-19 postnodals, 2 ( $87\frac{1}{2}$  per cent.) or 3 ( $12\frac{1}{2}$  per cent.) antenodal cells distal to the quadrilateral. On all the wings the cubito-anal cross-vein (= basal postcostal of de Selys) is close to the arculus, being proximal thereto by less than the total length of the arculus; point of separation of vein A (= postcostal of de Selys) from the hind margin of the wing only slightly distal to the level of the proximal end of the quadrilateral, or at that level, or even slightly proximal thereto.

♀. Dull yellow replacing pale reddish-brown of the male, pale stripes on upper surface of head more extended, those from the lateral ocelli to the eyes confluent in front of the median ocellus, hind lobe of prothorax more produced posteriorly, its central black spot circular,

mesepisternal black stripe narrower, its lateral edge ill-defined, a black stripe on each side of the dorsum of abdominal segment 2 for almost its whole length, brown on the anterior five sixths of 3-7 almost black, not paler in the fourth and fifth sixths, a mid-dorsal longitudinal yellow line on 2-9 (not 2-7 as in the original description of 1862), a transverse basal yellow ring on 2-7 (not 2-9 as in the original description); on the sides of 2-8 below the dorsal blackish is a longitudinal yellowish stripe confluent with the transverse basal yellow ring, ending posteriorly at the transverse black ring on 3-7, and below this yellowish stripe is a similar blackish stripe; 9 is brown with an oblique lateral yellow band running from the anterior margin backward and upward so as to be confluent with the posterior end of the mid-dorsal longitudinal yellow stripe already mentioned; 10 yellowish, dorsum brown, its entire posterior margin armed with about 14 spinules much longer and stouter than those of any other segment. Appendages longer than 10, very acute, brown. Genital valves yellow, lower margin with curved serrations.

Front wings with 18-20 postnodals, 2 antenodal cells distal to the quadrilateral. Hind wings with 15-16 postnodals, 2 antenodal cells distal to the quadrilateral.

Abdomen ♂ 40, ♀ 32; hind wing ♂ 25-26, ♀ 26-27; costal edge of stigma, front wing ♂ 1-1.1, ♀ 1.2; posterior edge of same stigma ♂ 1.5-1.8, ♀ 1.8-2 mm.

*Habitat.* — BRAZIL, Chapada, by H. H. Smith, 1 ♂ collector's number 44, 1 ♂ No. 109 (lacks abd. seg. 8-10), 2 ♂ lacking abdomens, 1 ♀ lacking abd. seg. 4-10, 1 ♀ lacking head.

The type (female) of *H. triangulare* was from "Brésil méridionale (Schott). (Mus. de Vienne.)"

#### 40. *Heteragrion aurantiacum* Selys.

(PLATE III, FIG. 40.)

*Habitat.* — BRAZIL: Rio de Janeiro, by H. H. Smith, 1 ♂ and parts of 3 ♂, November, 2 ♀, December, 1 ♀ and part of one other. Carnegie Museum, Pittsburgh.

PARAGUAY: Sapucay, by W. T. Foster; November, 1899, 4 ♂ (No. 22), December, 1899, 4 ♂ (No. 22), 1 ♀ (No. 58), January, 1900, 1 ♀ (No. 58). U. S. National Museum.

I am not certain whether all these specimens belong here or not, but they agree better with the description of *H. aurantiacum* than with

that of any other species. The original description of 1862 does not mention a line, at first brown but black in later life, which appears on the outer side of the yellow line bordering each side of the black mid-dorsal thoracic carina.

Genus PERILESTES.

The presence of one male and of parts of one male and two females from Chapada, by H. H. Smith, in the Carnegie Museum collection, and referable to this genus, has resulted in drawing up the following comparisons.

Males.

	<i>P. fragilis</i> ? Hagen (Chapada 2 ♂ as above). (Plate 3, figs. 44, 45, Plate 8, fig. 140.)	<i>P. cornuta</i> <sup>12</sup> Selys, Mem. Couron. Acad. Belg. xxxviii, p. 68. 886. (Selys' description.)	" <i>P. fragilis</i> ?" of Biol. Centr.-Amer. Neurop. p. 409. 1908. (1 ♂ Surubres in Costa Rica). (Plate IV., fig. 64.)
Vein $M_{1a}$ (=ultra- nodal sector of de Selys) begin- ing	Under, or at the level of the dis- tal edge of the stigma.	3-4 cells proximal to the level of the stigma	1-2 cells proximal to the level of the stigma.
Postnodals, front wing	11-12	14-15	13
Labrum	pale blue	black	pale brown
Nasus	pale blue, black at base	brown	pale brown.
Abdominal seg- ment 2	metallic-green, a mid-dorsal line and sides infe- riorly yellow	chiefly yellow o- chre with a dorsal black band	(like <i>cornuta</i> )
Abdominal seg- ments 3-6 with	no ante-apical yel- low ring, but with a narrow basal yellow ring	a broad basal and an anteapical yel- low ring	(like <i>cornuta</i> )
Superior append- ages, in dorsal view, having	at one-third length a lamellate ob- liquely truncated tooth directed caudad, not form- ing a right angle with the append-	basal half strongly dilated, flattened, this dilation end- ing suddenly at a right angle, the angle prolonged inferiorly as an	(damaged and distort- ed, more like <i>cor- nuta</i> )

<sup>12</sup> By analogy with *Lestes*, this name should be *cornutus*.

	age nor presenting the appearance of an acute spine in any view, followed by a slight obtuse tooth at nearly one-half the appendage-length, this latter tooth preceded and followed by a concavity, the distal concavity followed by a longer convexity ending at seven-eighths' length, apex moderately acute.	acute spine, terminal half of the appendage enlarged in its middle internally, then a little retracted at the apex, which is hairy	
Legs	yellowish, knees and upper surface of tibiae brownish or blackish	black, tibiae externally brown, tarsi red	
Ventral surface of thorax	reddish-yellow, pale green in the center	black	yellow
Length of abdomen in mm.	46	47	48
Length of hind wing in mm.	21	23-25	23
<i>Females.</i>			
	<i>P. fragilis?</i> Hagen, Bull. Acad. Belg. (2) xiv, p. 31, 1862 (Chapada, 2 ♀ as above)	<i>P. cornuta</i> Selys (From Selys' description)	<i>P. attenuata</i> Selys, Mem. Couron. Acad. Belg. xxxviii, p. 68, 1886. (From Selys' description)
Hind margin of prothorax	convex, without any horn or process	bearing at the middle a straight cylindrical, completely erect horn	forming at the middle only a slight tubercle, and not an erect stalk
M <sub>1a</sub> beginning	from one cell proximal to stigma to under the stigma	[not stated; as in male?]	at level of the vein [= proximal end?] of the stigma



Postnodals, front	14	do.	12
wing			
Black ray on second lateral thoracic suture	very narrow		narrow
Pale anteterminal yellow ring on abdominal segments 3-6	very indistinct, almost absent		narrow
Black rings on femora	very indistinct or absent	(feet yellow; interior of femora and of tibiae absent)	two
Length of abdomen in mm.	(broken)	40-42	41
Length of hind wing in mm.	21-24		22

It seems fairly certain that the pair which de Selys doubtfully referred to *fragilis* Hagen in 1886, and for which he suggested the alternative name of *cornuta*, are not *fragilis*. It is possible that the Porto Rican male above described may also be *cornuta*; it agrees better therewith than with *fragilis*. Finally *attenuata* Selys may not be specifically distinct from the true *fragilis* Hagen.

#### Genus ARGIA.

As is to be expected in any considerable collection of Odonata from tropical continental America, large numbers of specimens belonging to this genus are before me, some of them representing species, which seemingly were not described by de Selys. On the other hand, some of the forms which he and Hagen enumerated in 1865 are not to be found among the present material, so far as I can see.

To assist in the identification of members of this difficult genus and to correlate the South American species with those from Mexico and Central America, a synopsis of the principal color characters and of some of the structural features is herewith presented. As far as possible the same expressions and the same letters for indicating the divisions of this key have been employed as were used in the *Biologia Centrali-Americana*, volume Neuroptera, pages 69-74 and 358-361. One difference must be noted, however. In the 'Biologia,' the black humeral stripe was said to be "forked above" when "a dark mesepimeral stripe is fused with the humeral stripe proper at its lower, but not its upper, end" (*l. c.*, p. 69). It has seemed better, here and

now, to apply the expression "forked" to the dark humeral stripe whenever it divides into two diverging branches, one on the humeral suture, the other running up on the mesepimeron.

I repeat the statement of the 'Biologia' that the chief specific characters are furnished by the abdominal appendages of the males and the mesostigmal laminae of the females, although, owing to the difficulty of describing these structures accurately *and briefly*, recourse is had chiefly to figures rather than to words in the attempt to make them known.

KEY TO SOUTH AMERICAN SPECIES OF ARGIA MENTIONED IN THIS ARTICLE.

*Males.*

I. Total area of dark colors on abdominal segments 3-6 and thoracic dorsum *greater* than the total pale area on the same parts.

1. Thoracic dorsum not brilliantly metallic.

A. Labrum pale.

B. Pale colors on dorsum of 3-6 limited to a transverse basal ring and at most a fine mid-dorsal line; rear of head chiefly black.

C. Abdominal segment 8 mostly black on dorsum.

D (not represented).

DD Abd. segment 9 mostly black on dorsum, anterior half to fourth of its dorsum pale, superior appendages not bifid at tip.....*translata*.

CC. (not represented).

CCC. Abdominal segments 8 and 9 pale on dorsum.

a. (not represented).

aa. Abd. seg. 3 with the basal sixth or less blue, remainder of the dorsum black, 3 antenodal cells on the hind wings.

b. Inferior appendages bifid, abd. segs. 8 and 9 with an inferior longitudinal black stripe each side.

*reclusa*.

BB. Pale colors on dorsum of 3-6 consisting of a transverse basal ring and a mid-dorsal stripe on some or all of them, tapering posteriorly, 8 mostly blue on dorsum.

F. Superior appendages distinctly bifid, inner branch much longer than the outer.

Rear of head black, black humeral stripe not forked.

*sordida*.

Rear of head chiefly pale, black humeral stripe forked in its upper half to third.....*fosteri*.

FF. Superior appendages variously formed, but not distinctly or deeply bifid.

d. Antenodal cells on the front wing usually more than 3.

Inferior appendages in profile view with the lower branch forming a finger-like tapering process projecting caudad and curved up at tip; 3 antenodal cells on hind wings.

Larger species (abd. 25-29.5, hind wing 20-22 mm.), mesepimeron chiefly pale brown.

Mesepimeron without a black spot on the lowest fourth but with a pale brownish stripe, having some bronzy-green reflection, extending from the lower end of the humeral suture almost to the upper margin of the sclerite...*gerhardi*.

Mesepimeron with a black spot on its lowest fourth as wide as the pale antehumeral stripe, remainder of sclerite pale brown.

*gerhardi nigrior*.

Smaller species (abd. 23.5, hind wing 16.5 mm.); a black humeral stripe covering nearly all of the mesepimeron, of subuniform width, not forked.

*kokama*.

Inferior appendages shaped otherwise.

Mid-dorsal pale color on abd. segs. 3-6 a blue stripe, 3 antenodal cells on the hind wing.....*oculata*.

Mid-dorsal pale color on 3 a stripe, very short or reduced to a line or absent on 4-6.

Inferior appendages with lower branch (seen in profile) acutely pointed, projecting caudad distinctly beyond the upper branch and beyond the superior appendages, 3 antenodal cells on the hind wings.

Superior appendages strongly declined, reaching beyond the upper branch of the inferiors .....*mollis*.

Superior appendages not or little declined, not reaching caudad as far as the tip of the upper branch of the inferiors.

*difficilis*.

Inferior appendages with lower branch not acutely pointed, projecting but little beyond the level of the upper branch.

Mesepimeral branch of the forked humeral stripe not reaching to the upper margin of that sclerite, a short black line on the upper end only of the second lateral thoracic suture; 3 antenodal cells on the hind wing.....*hasemani*.

Mesepimeral branch of the forked humeral stripe reaching to the upper margin of

that sclerite, a narrow black stripe on the entire length of the second lateral thoracic suture; 4 antenodal cells on the hind wing.....*tamoyo*.

*dd.* Antenodal cells on the front wing usually 3 (but some *mollis* belonging properly under *d.* fall here).

*e.* Mid-dorsal [thoracic black stripe at least a little wider than either pale antehumeral stripe.

Rear of head chiefly black.

Larger species (abd. 24 mm. or longer, hind wing 18 mm. or longer).

Pale dorsal colors of abd. segs. 4-6 reduced to a line or absent. (Some *reclusa* fall here although properly belonging under B).

Pale dorsal colors of 4-6 more than a line; black humeral stripe forked in its upper third to two-fifths, lower branch of inferior appendages more acute than the upper, the latter not directed at all caudad.....*smithiana*.

Smaller species (abd. 22.5 mm. or less, hind wing 15.5 mm. or less); abd. segs. 4-7 with the pale mid-dorsal color reduced to a line or absent .....*thisma*.

Rear of the head chiefly pale, abd. segs. 1-7 clear blue violet, 3-7 with a terminal black ring, abd. 26, hind wing 19-20 mm. (From de Selys' description).....*lilacina*.

*ee.* (not represented).

AA (not represented).

2. Thoracic dorsum brilliant metallic copper.

G. Labrum chiefly metallic copper at least in its basal half; apical half, or only its front edge, yellow; lower branch of the inferior appendages less robust than the upper branch.

H. (not represented).

HH. Abd. segs. 3-7 black on dorsum, basal half of 3-6 blue, 8-10 blue on dorsum.....*jocosa*.

HHH. Abd, segs. 3-6 blue on dorsum apical third to sixth black, 7 black with a basal blue ring, 8-10 blue on dorsum.

*cupraurea*.

GG. Labrum yellow or orange throughout; lower branch of inferior appendages as robust as the upper branch, or more robust.

J. (not represented).

JJ. (modified). Abd. segs. 3-7 black on dorsum with a narrow transverse basal blue ring, 8-10 blue on dorsum .....*orichalcea* ?:

II. Total area of dark colors on abdominal segments 3-6 and thoracic dorsum *less* than the pale areas on the same parts.

I. Dorsum of abd. seg. 7 chiefly black, rear of head chiefly black, postbasal black streaks on 3-6, 8 and 9 blue, with an inferior black stripe on each side.

K. Inferior appendages longer than high at apex, deeply excised at tip.

L. Black mid-dorsal thoracic stripe wider than the carina.

Pale colors blue.

*tinctipennis* and *chapadae* (for their differences see under the latter, *postea*).

Pale colors violaceous.....*botacudo*.

LL. (not represented).

KK. Inferior appendages higher at apex than long.

Black mid-dorsal thoracic stripe wider than the carina .....*tupi*.

Black mid-dorsal thoracic stripe reduced to a line upon the carina only.  
*subapicalis*.

2., 3., 4. (not represented).

*Females.*

§ I. Dorsum of abdominal segments 3-6 mostly black.

A. Dorsum of abd. segs. 8 and 9 pale with black markings.

B. These markings consisting of two stripes occupying only the basal half (more or less) of 8 and 9.

C. (not represented).

CC. These stripes more or less confluent with each other.

CC. 1. Antenodal cells on the front wing 4.

D. (not represented).

DD. Mesepisternal tubercles absent.

DD. 1. Antenodal cells on the hind wing 4.

Pale antehumeral stripe one-half as wide (or less) as the black mid-dorsal, no mid-dorsal blue stripe on abd. segs. 4-6, rear of head black.....*sordida*.

Pale antehumeral stripe three-fourths as wide (or more) as the black mid-dorsal blue stripe present on the greater part of the length of 4-5 or 6, rear of head chiefly pale.....*fosteri*.

DD 2. Antenodal cells on the hind wing 3.

E. A pale mid-dorsal stripe on abd. segs. 3-5.

Mesepimeral part of the humeral stripe black.

Abd. seg. 10 black on dorsum with a pair of pale spots, mesepimeral branch of the black humeral stripe reaching to the upper margin of the sclerite.....*oculata*.

Abd. seg. 10 blue, mesepimeral branch of the black humeral stripe not reaching to the upper margin of the sclerite.

*hasemani*.

Mesepimeral part of the forked humeral stripe  
pale brownish, abd. seg. 10 black.

*gerhardi*.

EE. A pale mid-dorsal stripe on abd. seg. 3 only,  
or a mere line on 3-6.

F. Abd. seg. 10 pale on dorsum.

F. 1. Labrum largely or wholly black, mesostigmal lamina erect and projecting, mesepimeral branch of the black humeral stripe reaching to the upper margin of the sclerite.

*difficilis*.

F. 2. Labrum pale, mesostigmal lamina a carina forming the anterior margin of a groove.....*mollis*.

FF. Abd. seg. 10 black, labrum pale, mesepimeral branch of the humeral stripe pale brown.

Some *gerhardi*. (See above under E.)

CC. 2. Antenodal cells on front and hind wings 3.

Black of frons reaching down to nasus, mid-dorsal blue on 3 and 4 a mere line.....*tinctipennis*.

Black of frons reaching only as far down as the level of the first antennal joint or not so far, mid-dorsal blue on 3 and 4 a stripe.

Black humeral stripe of subuniform width, not forked, but enclosing a very small pale spot superiorly....*boiacudo*.

Black humeral stripe widening considerably in its upper third, which is forked, humeral branch more than a line.....*chapadæ*.

Black humeral stripe widening in its upper third on half, which is forked; humeral branch hardly more than a line.....*smithiana*.

BB. (not represented).

BBB. These markings consisting of two stripes as long as 8 and nearly as long as 9.

BBB. 1. Antenodal cells 5 on the front wing, 4 on the hind.

G. Mesepisternal tubercles well-developed.

H. Abd. seg. 10 pale with a pair of dark spots on the dorsum.  
*translata*.

HH. Abd. seg. 10 pale, unspotted on dorsum.

J. (not represented).

JJ. Thoracic dorsum and usually the vertex, nasus, and labrum also, with a coppery-red reflection.

*cupraurea* (and *cuprea*).

GG. Mesepisternal tubercles absent.

- b.* Mesepimeral black stripe reaching upward to or almost to the upper margin of the sclerite, dark colors on head and thorax with some metallic reflection.

*orichalcea* (and *ænea*).

*bb.* (not represented).

- BBB. 2. Antenodal cells 4 on both front and hind wings; inner edge of mesostigmal lamina continued caudad as a flattened ridge, rear of head chiefly pale.....*iralai*.

- BBB. 3. Antenodal cells more often 3 on all the wings.

Black humeral stripe not interrupted or forked, abd. segs. 3 and 4 chiefly violaceous.....*botacudo*.

Black humeral stripe interrupted, a shorter part on the upper end of the humeral suture, a longer and diverging mesepimeral part, 3-4 chiefly black dorsally with a pale median line

Some *reclusa* will fall here. (See also below.)

- AA. Dorsum of abd. seg. 8 chiefly black, of 9 as in B or BBB, a pale mid-dorsal line on 3-6.

AA. 1. Abd. seg. 10 pale on dorsum, no mesepisternal tubercles...*reclusa*.

AA. 2. Abd. seg. 10 chiefly black on dorsum, mesepisternal tubercles present.....*translata*.

§ II. (not represented.)

#### 41. *Argia translata* Hagen.

Calvert, Biol. Centr.-Amer. Neurop., pp. 76, 361, pl. IV, figs. 18, 30, 30 s. 1902, 1907.

COLOMBIA: Bonda, in Dept. Magdalena, July, 1 ♀, August, 6 ♂ 1 ♀, September, 1 ♂ 1 ♀, October, 1 ♂, November, 1 ♀. H. H. Smith. Carnegie Museum, Pittsburgh.

Three of these females (August, September, November) have the nasus chiefly or wholly black, the fourth (July) has it black posteriorly; all four have a perpendicular black line connecting the black of frons and of nasus.

#### 42. *Argia reclusa*.

(PLATE IV, FIG. 66.)

*Argia reclusa* Selys, Bull. Acad. Belg. (2) xx, p. 395, 1865. Hagen and Calvert, Bull. Mus. Comp. Zoöl., xxxix, p. 114, pl. 2, figs. 20a, 20b (♂ apps.), 1902.

♂. In most of the examples from Chapada and in that from Sapucay, the black of the frons extends between the antennæ broadly down to the nasus; in six specimens from Chapada and the two from Sete Lagoas the black is constricted for a shorter or longer distance to a perpendicular median line, but widens again at the fronto-nasal suture; the longer the constriction the less black on the anterior surface of the first antennal joint, which joint is entirely black in those speci-

mens in which the black is not constricted but extends broadly down to the nasus. Almost the whole nasus and labrum blue. Prothorax with a round blue spot on each side of the dorsum of the middle lobe, and each lateral end of the hind lobe is blue. The pale (blue) antehumeral stripe was described by de Selys as not reaching to the upper margin of the sclerite,<sup>4</sup> but it does reach there in all the present material; its upper end is decidedly narrower and has in some specimens almost entirely faded out, and the Selysian type may have been just such an example; at mid-height the pale antehumeral stripe is from two-fifths to one-fourth as wide as the black mid-dorsal. Much variation exists in the black humeral stripe, even in those males from Chapada which have not the black of the frons constricted; the humeral stripe varying from a condition in which it is as wide as the pale antehumeral at mid-height and is of subuniform width almost to the upper end of the mesepimeron, through conditions in which it is narrower and forked in the upper part of its extent, the humeral branch reaching the upper end of its suture, the mesepimeral branch falling far short of the upper margin of its sclerite, to those where the stripe is broken into two separated parts, a shorter on the upper end of the humeral suture, a longer diverging from the lower part of that suture and running upward on the mesepimeron to about two-thirds, or less, of the height of that sclerite, tapering upward to an acute point. The black stripe on the second lateral thoracic suture is often sharply defined. Abdominal segments 4-6 may have a fine pale mid-dorsal line; 8-10 have an inferior black stripe on each side as long as the segments.

♀ (*not hitherto described*). Differs from the male as follows: In only one specimen does the black of the frons extend broadly down between the antennæ to the nasus; in all others it is more or less constricted or, in four out of twenty-five heads from Chapada, the black of the frons is separated from the black line on the fronto-nasal suture by pale ochre, which color generally replaces the blue of the male on head and thorax. In all the present material the black humeral stripe is in the last of the conditions described above for the male, *i. e.*, broken into a shorter upper humeral portion and a longer lower mesepimeral portion, the latter reaching upward to from three-fifths to five-sixths of the height of the sclerite, but never attaining the site of the first lateral thoracic suture, nor curving backward at its upper end; black line on the second lateral thoracic suture of variable length.



The dorsal violet spot of abdominal segment 2, which at its widest in the male is more than half as wide as the segment, is here reduced to a stripe never more than one-third as wide as the segment and often still narrower. The dorsal surface of abdominal segment 8 is black for its entire length in most of the ten specimens in which this segment is present, this solid black dorsum evidently due, as some examples show, to a fusion of two longitudinal stripes along the mid-dorsal line, each dorsal stripe also fusing for a variable part of its length from the anterior end backward with the adjoining inferior lateral black stripe present also in the male; each dorsal black stripe is occasionally broken into a stripe followed by a black spot at the hind end of the segment. Abdominal segment 9 has a pair of dorsal black spots or short stripes extending from the anterior end to one-half or three-fifths of the length of the segment, confluent with each other only at the extreme base, but each one confluent to a greater extent with the adjoining inferior lateral black stripe, which latter usually, but not always, reaches to the hind end of the segment; 10 pale (blue?) with no black markings. In the male the inferior lateral margin of the abdominal segments is pale yellowish or bluish, except at the hind end of each segment, there being no black lines or stripes on 1-7 distinct from the dorsal black; the females agree, although the inferior lateral pale color is rather wider.

In both sexes an interrupted pale transverse occipital line may, or may not, exist between the right and left postocular spots.

*Dimensions*: Abdomen ♂ 26-28 (Chapada), 28-29 (Sete Lagoas), 30.5 (Sapucay), ♀ 25.5-28 (Chapada); hind wing ♂ 18-20 (Chapada), 20.5-21 (Sete Lagoas), 21.5 (Sapucay), ♀ 19.5-21.5 (Chapada) mm.

*Habitat*: BRAZIL, Chapada, by H. H. Smith, 15 ♂ and parts of 20 others, some numbered 48, 83, 110, 110a and 112, 8 ♀ and parts of 21 others, some numbered 47 and 111, some dated May; Sete Lagoas, Minas Geraes, by J. D. Haseman, May 6, 1908, 2 ♂. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, by W. T. Foster, January 16, 1903, 1 ♂ numbered 33 (others numbered 33 belong to *A. fosteri* and *A. thisma*). United States National Museum.

The variations in the form of the black humeral stripe of *A. reclusa* resemble some of the conditions found in *A. mollis*. This is especially true of the females, and, although four antenodal cells are more fre-

quently found on the front wing of *mollis* and three on that of *reclusa*, yet not rarely individuals of the one species possess this character of the other. The following appear to be more constant features separating the females: *reclusa* female has a small but distinctly developed mesostigmal lamina (see pl. IV, fig. 66) which is distinctly visible as a projection when the thorax is examined from the side in profile view (the homolog of the lamina, see page 135, in *mollis* not visibly projecting), no black marks on the nasus other than at the fronto-nasal suture, the dorsal black stripes on abdominal segment 8 usually reaching the whole length of the segment. Compare also the descriptions of the black humeral stripe in *mollis* and *reclusa* females.

#### 43. *Argia sordida*.

*Argia sordida* Hagen, Bull. Acad. Belg. (2) xx, p. 387, 1865. Hagen & Calvert, Bull. Mus. Comp. Zoöl., xxxix, p. 114, pl. 1, fig. 20 (labium), pl. 2, figs. 3, 3a (appendages ♂), 23 (mesostigmal laminæ ♀), 1902.

The only existing description of the colors of this species — the original one of 1865 — is comparative only and so brief as to give little information, wherefore the following, based in part on some of Hagen's cotypes.

♂. Rear of the head black. Pale antehumeral stripe three-fifths as wide as the black mid-dorsal. Black humeral stripe not forked above, gradually widening from above downward; at mid-height one third to one fourth as wide as the pale antehumeral. A short black mark at the upper end only of the second lateral thoracic suture. Abdominal segment 2 violet, with a black stripe on each side from anterior to posterior end, which stripe just before the latter end widens, so as to approach closely, but not meet, its fellow of the opposite side on the dorsum; 3-7 black, with a transverse basal blue-violet ring prolonged on 3 as a mid-dorsal stripe tapering posteriorly to four-fifths of the segment, prolonged on 4 similarly to one-fourth of the segment, while on 7 the ring is mid-dorsally interrupted with black; 8-10 dorsally pale brown in the dried specimens (blue? in life), their sides black from end to end, the black more extensive at the hind end, especially on 8, where it approaches that of the opposite side on the dorsum, finally meeting it at the extreme hind end of the segment or in the hindmost sixth; or on 10 the black may so invade the dorsum as to leave only two small pale spots thereon. Compared with Hagen's figures cited above, the inferior appendages seen in profile

are less deeply bilobed at the apex than shown in his figure 3*a*, with the result that the lower lobe or branch is less acute.

The male from Sao Sebastião has the blue-violet mid-dorsal stripe on 3 reaching to only two-fifths of the segment and no mid-dorsal stripe on 4, but otherwise it seems like the others.

♀. Differs from the male as follows: A pale stripe bordering the eyes posteriorly. Pale anthumeral stripe nearly half (or two-fifths in one Rio Janeiro ♀) as wide as the black mid-dorsal at mid-height, the black humeral stripe half to nearly as wide as the pale antehumeral at the same level. Black lateral stripes of abdominal segment 2 meeting on the dorsum in the first, sixth, and eighth eighths of the segment's length, so that the blue on the dorsum is limited to an elliptical spot reaching from the second to the fifth eighth inclusive, and a smaller isolated spot or dot in the seventh eighth. Transverse basal blue ring on 3-7 mid-dorsally interrupted with black; blue mid-dorsal longitudinal stripe on 3 reaching back to two-thirds or three-fourths of the segment's length, but not confluent with the transverse basal blue ring; no mid-dorsal blue stripe on 4. 8-10 predominantly black, pale brown (blue? in life) forming a posterior dorsal border to 8 and 9 the anterior margin of which is straight on 9, but trilobed on 8, the middle lobe tapering forward to nearly the basal fourth of the segment, or trilobed on both 8 and 9, the middle lobe soon becoming a mere line prolonged forward mid-dorsally, or this middle lobe prolonged forward as a wider stripe almost to the base of 9 and to the basal fourth of 8; dorsum of 10 may be chiefly pale or wholly black. Mesepisternal tubercles cannot be said to be present in this species; only a very low convexity occupies the site of each. Three Nova Friburgo females have longer abdomens (31 mm.), two of the Rio de Janeiro examples have shorter hind wings (24 mm.) than the previously published dimensions admit.

All the wings of all the specimens listed below have four antenodal cells distal to the quadrilateral (except 5 in one front wing of 1 Rio de Janeiro ♀) and in all the pterostigma surmounts more than one cell — rarely as much as two cells.

*Habitat*: BRAZIL, Nova Friburgo in Rio by Beschke, cotypes of Hagen, 4 ♂ 2 ♀. Museum of Comparative Zoölogy. 1 ♂ 2 ♀. Collection of P. P. Calvert, ex coll. P. R. Uhler.

Rio de Janeiro, in November and December, by H. H. Smith, 1 ♀ and parts of 2 others. Carnegie Museum.

Sao Sebastião in 1900 by A. Hempel, 1 ♂. Academy of Natural Sciences.

The original description states that this species is "Presque semblable à l'*A. Claussenii*," after which remark some differences from *claussenii* are given, without any mention of the abdomen. The abdomen of *claussenii* is described as blue, "Les segments 2e-8e terminés et bordés latéralement de noir. Cette couleur occupant plus d'espace sur les derniers." One might, therefore, have expected a larger area of blue on the abdomen of *sordida* than examination of the cotypes described above proves to be actually the case.

44. ***Argia fosteri*** sp. nov.

(PLATE IV, FIGS. 58, 69, 69s.)

♂. Rear of the head chiefly pale, with distinctly less or almost as much black around the occipital foramen. Pale (blue) antehumeral stripe half to three-fifths as wide as the black mid-dorsal. Black humeral stripe forked in its upper half or third, both branches of the fork reaching to the upper margin of the sclerite; below the fork the humeral stripe is a little wider than the pale antehumeral. A brown line on the whole length of the second lateral thoracic suture except at the upper end which is black. Abdominal segment 2 blue, with a black stripe on each side from end to end, widened mesad at four-fifths of the segment's length toward, but not meeting, its fellow of the opposite side, the mid-dorsal blue on the anterior part of the segment being half as wide as the segment, or the right and left black stripes may fuse on the dorsum for the hindmost third of the segment and the mid-dorsal blue on the anterior two-thirds is reduced in width; often from the inferior edge of each lateral black stripe there extends backward (caudad) an oblique fork or branch toward or to the inferior margin of the segment at about two-thirds of its length. Abdominal segments 3-7 black, with a transverse basal blue ring which on 3-5 or 6 is produced, tapering backward, as a mid-dorsal stripe reaching to two-thirds or one-half of 3, one-fourth to two-fifths of 4, and one-fifth of 5 and 6; the inferior lateral margins of 3-7 narrowly blue, except in the hindmost fourth to sixth of each segment; 8-10 blue, with an inferior black stripe on each side as long as the segments, or not occupying the most anterior third of 8; in some a pair of posterior dorsal black spots on 8.

Wings yellowish throughout; stigma with the distal side more oblique than the proximal.

♂ (*immature*). Differs from the preceding description in having very little dark color on the rear of the head, excepting the transverse blackish stripe, which bounds the pale postocular spots posteriorly; only the upper end of the humeral branch of the humeral fork is indicated by a brownish spot; abdominal segment 2 marked as in the first case above described, no oblique branch from the lateral black stripe; the black markings of the adult are generally bronze-green.

♀. Differs from the male as follows: Rear of the head as described for the immature male; pale (blue) antehumeral stripe at mid-height three-fourths as wide to nearly as wide as the black mid-dorsal; black humeral stripe below the fork subequally wide to two-thirds as wide as the pale antehumeral; abdominal segment 2 marked as in the second case described above for the male, no inferior oblique branch from the lateral black stripe, although in some specimens an isolated round brown spot appears to represent it; transverse basal blue ring on 3-7 much narrower, mid-dorsally interrupted with black in some specimens, a narrow blue mid-dorsal stripe on 3-5 or 6, extending from the transverse basal pale ring (or from just behind it, when it is interrupted) to two-thirds or three-fourths of the length of each segment; 8-9 marked as in the male, but having in addition a pair of longitudinal dorsal black stripes, extending from the base to three-fifths or two-thirds of the length of each segment, the two on 8 united on the mid-dorsal line from base backward (caudad) for a varying distance, while on 9 they are connected only by a fine transverse line at the extreme base; the hind ends of these black stripes narrower, rounded; in some specimens a black line on the transverse posterior row of spines of one or both of 8 and 9; 10 blue, with no black markings even on the sides.

♂ ♀. Stigma of front wings surmounting more than one (45 per cent. ♂, 50 per cent. ♀), one (40 per cent. ♂, 50 per cent. ♀) or less than one (15 per cent. ♂) cell; of the hind wings surmounting one (60 per cent. ♂, 87.5 per cent. ♀) or more than one (40 per cent. ♂, 12.5 per cent. ♀) cell.

Antenodal cells on the front wings 4 (55 per cent. ♂, 62.5 per cent. ♀), 5 (35 per cent. ♂, 37.5 per cent. ♀), or 4 + (10 per cent. ♂); on the hind wings 4 (80 per cent. ♂, 100 per cent. ♀), 3 (15 per cent. ♂) or 4 + (5 per cent. ♂). These percentages based on 10 ♂, 4 ♀.

*Dimensions*: Abdomen ♂ 28.5–30, ♀ 27–29; hind wing ♂ 22–23.5, ♀ 23–25 mm.

*Habitat*: PARAGUAY, Sapucay, by W. T. Foster; November, 1899, 5 ♂ 1 ♀ (collector's number 15), 1 ♂ 3 ♀ (collector's number 16 — this number is attached also to 2 ♀ of another species); January 11 and 16, 1903, 4 ♂ (collector's number 33, which is attached also to a male of *Argia thisma* and a male of *A. reclusa*). U. S. National Museum.

45. *Argia gerhardi* sp. nov.

(PLATE IV, FIGS. 60, 70, 70s.)

♂. Rear of the head black, a narrow pale stripe along each eye margin; black of the frons not reaching as far down as the bases of the antennæ, the first joint of which is pale anteriorly. Pale (violet) antehumeral stripe half as wide as the black mid-dorsal which latter often has a dark green reflection. A dark line on the entire length, or on only the upper part of the humeral suture, in the former case wider at its upper end; from the lower end of the suture extends upward a pale brownish mesepimeral stripe having some bronzy-green reflection and which diverges from the suture, ending a little below the upper margin of the sclerite and a little anterior to a short black line usually present on the upper end of the obsolete first lateral suture, or this pale brown stripe may be wider and border the humeral suture for its whole length, reaching the upper margin of the mesepimeron and back to the obsolete first lateral suture and at mid-height may equal in width the pale antehumeral. Second lateral thoracic suture with a stripe for its entire length, brownish below, blackish above, on the stripe almost obsolete except at the upper end. Abdominal segment 2 blue dorsally, each side with a longitudinal black stripe reaching from base to five-sixths of the segment's length, widening mesad to its hind end, but not meeting its fellow of the opposite side, sometimes broken into a stripe and a spot; dorsal blue between these two stripes at its widest two-thirds as wide as the segment; side below the black stripe pale, yellowish, unmarked. Segments 3–7 black, with a narrow transverse basal pale ring, which on 3–5 is confluent with a mid-dorsal violet or blue stripe, tapering posteriorly, reaching to five-sixths or the whole length of 3, to half or five-sixths of 4, to two-fifths or not beyond the basal ring of 5, or 5 and 6 may have a fine pale mid-dorsal line on the greater part of their length; sides of 3–6 inferiorly pale, except in the hindmost

sixth. Segments 8 and 9 blue, with an inferior black stripe on each side as long as the segments, or interrupted on 8; 10 black.

♀. Differs from the male as follows: a short pale line on each side of the vertex of the male, between lateral ocellus and adjoining antenna, is enlarged in young, but not in older females, into a spot, which in the young may, or may not, be confluent with the spot of the opposite side; black of the frons incised on each side of the median ocellus in the younger; but not in the older specimens; black mid-dorsal thoracic stripe in some without any green reflection; humeral line and mesepimeral stripe paler and indistinct, no black line on the upper end of the obsolete first lateral thoracic suture in younger females; second lateral suture with a short black line on its upper part only; dorsal blue of abdominal segment 2 reduced to a narrow stripe as long as the segment, lateral black stripe wider and reaching the entire length of the segment; blue mid-dorsal stripe on 3 and 4 as long as in the male, but narrower, even reduced to a line in some; 5 and 6 with a fine pale mid-dorsal line; 8 and 9 have in addition to the inferior lateral black stripe on the male a dorsal black spot occupying the first two-fifths to three-fourths of 8, half to two-thirds of 9, divided at its hind end ( $\therefore$  = two fused longitudinal stripes) and confluent on each side at base with the inferior lateral black stripe; in some a small apical dorsal black spot on 9, with which in three specimens the basal black is united, thus forming a complete mid-dorsal black stripe narrowing posteriorly; some pale spots on 10 in younger females.

♂♀. Wings pale yellowish or pale brownish. Stigma of the front wings surmounting more than one (63 per cent. ♂, 86 per cent. ♀), one (33.3 per cent. ♂, 10 per cent. ♀) or less than one (3.3 per cent. ♂♀) cell. Stigma of the hind wings surmounting more than one (73 per cent. ♂, 90 per cent. ♀), one (23 per cent. ♂, 10 per cent. ♀) or less than (3.3 per cent. ♂) cell.

Antenodal cells on the front wings 4 (93 per cent. ♂, 83 per cent. ♀), 3 (10 per cent. ♀), 3 + (3.3 per cent. ♂♀), 4 + (3.3 per cent. ♂) or 5 (3.3 per cent. ♀); on the hind wings 3 (86 per cent. ♂, 100 per cent. ♀) or 3 + (14 per cent. ♂). All the percentages based on 15 ♂, 15 ♀.

*Dimensions*: Abdomen ♂♀ 25–29.5; hind wing ♂ 20–22; ♀ 21–24 mm.

*Habitat*: BOLIVIA, Chulumani by W. J. Gerhard, November 30, 1898–January 7, 1899, 28 ♂ 18 ♀; Road to Coroico, Yungas, by

the same, April 7, 1899, 2 ♂ 1 ♀, April 8, 1 ♀, and April 20, 1899, 1 ♂. Academy of Natural Sciences of Philadelphia.

45a. *Argia gerhardi nigrior* subsp. nov.

♂. Differing from the typical *gerhardi* in that on the lowest fourth of the mesipimeron is a black spot as wide as the pale antehumeral stripe and continued in subequal width upon the mesinfraepisternum; nearly all the remainder of the mesipimeron is pale brown with less bronzy-green reflection than in *gerhardi* type; the black stripe on each side of abdominal segment 2 reaches to the hind end of the segment by a narrow prolongation of its lateral edge. These differences appear to be indicated in teneral examples also.

Stigma of the front wings surmounting more than one (60 per cent.), one (33.3 per cent.) or less than one (6.7 per cent.) cell; of the hind wings surmounting more than one (97 per cent.) or less than one (3.3 per cent.) cell.

Antenodal cells on the front wings 4 (93 per cent.), 3 + (3.3 per cent.) or 3 (3.3 per cent.); on the hind wings 3 (97 per cent.) or 3 + (3.3 per cent.). Percentages based on 15 ♂.

♀. The single female which can be referred here differs from the same sex of typical *gerhardi* by having the ninth abdominal segment entirely black; it does not possess the black mesepimeral spot of the male.

*Dimensions*: Abdomen ♂ 26–29, ♀ 27; hind wing ♂ 19–21, ♀ 21.5 mm.

*Habitat*: BOLIVIA, near Coroico, Yungas, by W. J. Gerhard, April 11, 1899, 6 ♂, May 9; 1 ♀; road to Coroico, April 19, 3 ♂; twelve miles northeast of Coroico, by the same, May 20, 1899, 9 ♂, May 24, 1 ♂. Academy of Natural Sciences of Philadelphia.

That *nigrior* is a geographical, not a seasonal, form of *gerhardi* is evidenced by the facts that typical *gerhardi* and *nigrior* were taken at nearly the same time, and that the peculiar markings of *nigrior* are indicated in teneral (immature) individuals.

46. *Argia kokama* sp. nov.

(PLATE IV, FIGS. 71, 71s.)

♂. Black of the frons reaching down between the bases of the antennæ as a moderately wide band to the nasus. Rear of the head black, a very narrow pale stripe bordering the eye-margins inferiorly.



Pale (violet) antehumeral stripe three-fifths as wide as the black mid-dorsal. Black humeral stripe of subuniform width, as wide as the pale antehumeral, not forked. A blackish-brown stripe three-fourths as wide as the black humeral on the entire length of the second lateral thoracic suture.

Dorsum of abdominal segment 2 violet occupying two-thirds of the width of the segment, bounded on each side by a black stripe extending the entire length of the segment and widened mesad at four fifths length, but not meeting its fellow of the opposite side, subsequently narrowed in the hindmost fifth; this black stripe appears to be due to a fusion of two narrower parallel stripes, one superior, one inferior, probably more or less separated from each other in earlier stages; inferior lateral margin of the tergite of 2 pale for its entire length.

Dorsum of 3 and 4 predominantly violet, a longitudinal black stripe on each side meeting its fellow of the opposite side in the hindmost sixth of the dorsum; 5-7 black, with a narrow transverse basal pale ring; 8-9 blue, with a black stripe on each side as long as the segments; 10 black.

Wings faintly obscure yellowish, stigma surmounting slightly more than one cell on all. Front wings with four antenodal cells, hind wings with three.

Abdomen 23.5, hind wing 16.5 mm.

♀ unknown.

*Habitat*: PERU, Iquitos, Staudinger, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

The specific name proposed is that of a human tribe of the vicinity.

The type specimen is pruinose on the sides of the prothorax, mesepimeron and metepimeron before and behind the brown stripe of the second lateral suture, pectus, coxæ, some of the sclerites of the interalar dorsal area, and parts of the dorsum and sides of the first abdominal segment.

#### 47. *Argia oculata* Hagen.

*Argia oculata* Calvert, Biol. Centr.-Amer. Neurop., pp. 81, 367; pl. iv, figs. 11, 36, 36s, 36i-ii. 1902, 1907.

Purely for convenience the present material is grouped into two lots:

##### a. Northern South America.

COLOMBIA, Cacagualito, in Dept. Magdalena, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

VENEZUELA, La Guaira, by Lyon and Robinson, July 3, 1900, 3 ♂; San Julian, by M. W. Lyon, Jr., July 20, 1900, 2 ♂.

b. Southwestern Brazil.

The following notes apply only to the Brazilian specimens.

♂. Differs from the northern, typical *oculata* Hagen chiefly in its smaller size (see below). Blue spots on the dorsum of the middle prothoracic lobe sometimes absent. Blue antehumeral stripe two-fifths to one-half as wide as the black mid-dorsal at mid-height. Black humeral stripe very slightly wider at its two ends, occupying nearly all of the mesepimeron, at mid-height  $1\frac{1}{4}$  times to equally as wide as the blue antehumeral, not forked<sup>13</sup> but enclosing a very small blue spot at its upper end, or forked in the upper third or less as in typical *oculata*, or in one example in the upper half, the humeral branch of the fork being a mere line except at its upper end, both branches reaching to the upper margin of the sclerite. A black stripe on the whole length of the second lateral thoracic suture, or occasionally obsolete, except at the upper end. The width of the dorsal blue on the anterior part of abdominal segment 2 is  $\frac{1}{3}$  to  $\frac{3}{5}$  of that of the segment; the mid-dorsal blue tapering posteriorly on 3-6 reaches from the base backward to three-fourths or four-fifths of the length of 3, two-thirds to four-fifths of 4, one-third to two-thirds of 5, one-tenth to one-half of 6. Stigma of the front wings surmounting more than one (55 per cent.) or one (45 per cent.) cell, of the hind wings surmounting one (60 per cent.) or more than one (40 per cent.) cell. Antenodal cells on the front wing 4 (80 per cent.) or 3 (20 per cent.), on the hind wings 3 (95 per cent.) or 4 (5 per cent.). Percentages based on 10 ♂.

Abdomen 27-29.5 mm.; hind wing 18-21.5 mm.

♀. Of the females which have been labeled by the collector with the same numbers as the males, or which appear to be conspecific, none have more than the first six of the abdominal segments, some still less. The mesostigmal laminæ are very similar or identical with that figured<sup>14</sup> for *oculata* ♀ and resemble less the corresponding figures for *A. difficilis*<sup>15</sup> and *A. adamsi* §. In all the labrum is either bordered and medially crossed with black, or is wholly black; there is more or less black on the nasus, and the black of the frons reaches down between

<sup>13</sup> In *oculata* from Mexico, etc., the humeral stripe is often forked in its upper third or less, although I have spoken of it as "not forked" in the "Biol. Centr.-Amer. Neur.," p. 81. This is one of the cases referred to, *antea*, pp. 117-118, where I think it desirable to enlarge the meaning of the word "forked" used in this connection.

<sup>14</sup> Biol. Centr.-Amer. Neur. tab. 4, fig. 11.

<sup>15</sup> *L. c.* tab. 4, fig. 15.

§ *L. c.* tab. 10, fig. 5.

the antennæ to the nasus in the form of a median perpendicular line, or of a wider stripe; in all cases where the segments are present, 3-5 have the mid-dorsal blue *stripe* (not line) reaching to at least half of the length of each segment, and 6 has a blue line reaching to one-fourth length. The length of the hind wing varies from 19.5 to 23 mm.

*Habitat*: BRAZIL, Ch pada, by H. H. Smith, 3 ♂ and parts of 10 others, some numbered 186, 187; parts of 8 ♀, some numbered 186, 186*a*, 186*b*. Carnegie Museum, Pittsburgh.

#### 48. *Argia mollis*.

(PLATE IV, FIG. 61.)

*Argia mollis* Hagen in Selys, Bull. Acad. Belg. (2) xx, p. 398. 1865. Hagen & Calvert, Bull. Mus. Comp. Zoöl. xxxix, p. 112, pl. 1, figs. 14, 14*a*. 1902.

♂. The males referable to the above-quoted description and figure show the following slight differences from the former: prothorax often with a pair of dorsal blue spots on the middle lobe, a black stripe on the entire length of the second lateral thoracic suture, the dorsal oval violet spot reaches the hind end of abdominal segment 2, 3 has a narrow mid-dorsal violet stripe, tapering posteriorly, for more than the anterior half of the segment; abdomen 27-29, hind wing 20-21 mm.

The following details may also be added: Black of the frons apparently extending down between the antennæ to the nasus, but its outlines in the present material are often difficult to trace; 8-10 have an inferior black stripe on each side as long as the segments; antenodal cells on the front wings usually four, on the hind three.

There is much variation in the black humeral stripe from the condition (*a*) where it is, at mid-height, one-and-one-half times as wide as the pale antehumeral, wider at both ends, its width at the upper end extending from the humeral suture to the obsolete first lateral and enclosing a small pale spot; through (*b*), where at mid-height it is only half as wide as the pale antehumeral and is forked for its upper half or less, the mesepimeral branch reaching up only seven-eighths of the way to the upper margin of the sclerite and curved toward, but stopping short, of the obsolete first lateral suture (on the upper end of which latter is a short isolated black line), the humeral branch a line except at its upper end where it reaches the upper margin of the sclerite; to (*c*), where the mesepimeral branch reaches up only three-fourths of the way to the upper margin of the sclerite and is not all curved toward

the obsolete first lateral suture. Condition (*a*) would appear to be that nearest the typical *mollis*, judging from the expression "Thorax noir en avant jusque vers la Ire suture latérale." One male of condition (*c*) has a black stripe on the upper end only of the second lateral thoracic suture and the dorsal violet of abdominal segment 2 apparently not reaching to the hind end of the segment, thus approaching the type in these two respects.

♀. The female of this species has not been described. Females labeled by the collector with the same numbers as the preceding males differ from them as follows: Black of the frons extending broadly down between the antennæ, but abruptly contracted to a narrow median "isthmus" before again widening at the fronto-nasal suture; nasus with a pair of small black marks; pale antehumeral stripe at mid-height half to two-fifths as wide as the black mid-dorsal (*i. e.* a little wider than in the ♂); black humeral stripe at mid-height half to equally as wide as the pale antehumeral, forked in its upper fifth or more, mesepimeral branch wider, curved toward the upper end of the obsolete first lateral thoracic suture to which it may or may not reach, humeral branch wider at its upper end which reaches the upper end of the suture, a mere line or even obsolete when the forking is deep, in the latter case of course isolated from the mesepimeral branch; a pale mid-dorsal line on the greater part of 3-5; 8 and 9 in addition to the inferior lateral black stripe have each a pair of dorsal stripes reaching from the base to one-half or two-thirds of 8 or one-half of 9, each fused for the greater part of its length with the adjacent lateral stripe, but with its fellow dorsal at the extreme base only. Each feebly developed mesostigmal lamina appears to form the anterior boundary of a slight obliquely transverse groove, which is bounded posteriorly by a still lower carina, carina and lamina united laterad, slightly divergent mesad, so that the groove is closed laterad but open mesad.

Abdomen 25-29, hind wing 21-22.5 mm.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 15 ♂ and parts of 12 (?) others, some number 164*a*, 123 or 128, some dated May; 13 ♀ and parts of 14 others, some numbered 164*b*. Sete Lagoas, Minas Geraes, May 3, 1908, by J. D. Haseman, 1 ♀. Carnegie Museum, Pittsburgh.

49. *Argia difficilis* Selys.

*Argia difficilis* Calvert, Biol. Centr.-Amer. Neurop., pp. 84, 369, pls. iv, fig. 15, viii, figs. 42, 42s, x, 4, 4s. 1902, 1907.

*Habitat*: COLOMBIA, Bonda in Dept. Magdalena, June, 1 ♀, August, 1 ♀, by H. H. Smith. Carnegie Museum, Pittsburgh.

For some comparative notes on this species, see under the following.

50. *Argia hasemani* sp. nov.

(PLATE IV, FIGS. 59, 72, 72s.)

♂. Rear of the head black, a narrow pale stripe along each eye-margin; labrum, nasus, and lower part of frons pale (violaceous?). Pale (violet) antehumeral stripe half as wide as the black mid-dorsal. Black humeral stripe at mid-height subequal in width to the pale antehumeral, forked at its upper end, the mesepimeral branch not reaching, the humeral branch reaching, to the upper margin of the sclerite; a short black line at the upper end of the second lateral thoracic suture. Abdominal segment 2 violet above, a black stripe on each side from end to end of the segment, approaching, but not meeting, its fellow of the opposite side on the dorsum just before the hind end, violet of the anterior part of the segment one-half to two-thirds as wide as the segment itself; 3-7 black, with a narrow transverse basal pale ring, which on 3 is prolonged backward as a narrow violet stripe tapering posteriorly to two-thirds of the segment's length; a fine pale mid-dorsal line on the greater part of the length of 4 and 5, the inferior lateral margin of 2-7 pale, more narrowly so at the hind ends of 3-7; 8-10 blue, with an inferior black stripe on each side as long as the segments, in addition to which one male, but not the other, has an anteriorly bilobed black dorsal spot on the posterior half of 8.

♀. Differs from the male as follows: pale predominating (in 2 ♀) on the rear of the head, owing to the widening of the pale stripes along the eye-margins; pale antehumeral stripe one-half to three-fifths as wide as the black mid-dorsal; black humeral stripe three-fifths to two-thirds as wide as the pale antehumeral, shaped as in the male, or (in 1 ♀) forked in its upper half, with the humeral branch a mere line, except at its upper end, where it reaches the upper margin of the sclerite, mesepimeral branch much wider, not reaching the upper margin of the sclerite; pale mid-dorsal color on abdominal segment 2 not more than one-fourth to one-third as wide as the segment, pale mid-dorsal stripe on 3-5 reaching from the pale transverse basal ring to

four-fifths or five-sixths of the length of each segment, about one-fifth as wide as 3, and narrower on 4 and 5, tapering posteriorly only slightly at the hind end; inferior lateral black stripe absent from the first fourth of 8 and tending to disappear from the hindmost third of 9; in addition 8 and 9 have a pair of dorsal black stripes, reaching from the base to two-thirds of 8 and half of 9, not confluent with the inferior lateral stripes, and connected with each other at the extreme anterior end of their respective segments, their hind ends narrower, rounded; in one ♀ 8 has a pair of black dorsal spots at the hind end of the segment in line with the two dorsal stripes, thus giving the latter the appearance of being interrupted; 10 entirely blue, its posterior dorsal margin deeply and narrowly cleft.

♂♀. Stigma of all the wings surmounting more than one cell (100 per cent. ♂♀). Antenodal cells of the front wings 4 (75 per cent. ♂, 66.7 per cent. ♀) or 3 (25 per cent. ♂, 33.3 per cent. ♀), of the hind wings 3 (100 per cent. ♂, 66.7 per cent. ♀), 4 (16.6 per cent. ♀) or 3 + (16.6 per cent. ♀). Percentages based on 2 ♂, 3 ♀.

*Dimensions*: abdomen ♂ 26.5–28, ♀ 25–27; hind wing ♂ 19.5–20.5, ♀ 20–22 mm.

*Habitat*: — BRAZIL, Fazenda de Amaratu, Bom Fim in the State of Bahia, November 20 and 21, 1907, by J. D. Haseman, 2 ♂ 3 ♀. Carnegie Museum, Pittsburgh.

The male of this species so closely resembles that of *A. difficilis* Selys<sup>16</sup> that I should hesitate to propose a distinct name for it were it not that the females (if I have correctly associated them) show a number of differences from *difficilis* ♀. Both sexes of *A. hasemani* differ from those of *A. difficilis* in having the mesepimeral branch of the black humeral stripe *not* reaching to the upper margin of the sclerite and in having the inferior half of the sides of abdominal segment 2 pale, unmarked with black, while in *difficilis* there is a second longitudinal black stripe on each side of 2 below the one which bounds the dorsal violet; this second or inferior lateral black stripe may be entirely distinct from the superior stripe or united with it to a varying degree, so that in some (probably aged) individuals of *difficilis* the sides of 2 are even wholly black. The males of *hasemani* further differ from those of *difficilis* in that the inferior branch of the inferior abdominal appendages is much less acute. The females of *hasemani* differ from those of *difficilis* by their pale labrum, nasus, and

<sup>16</sup> See Calvert, Biol. Centr.-Amer. Neur. p. 369.

most of frons (there is a black line on the fronto-nasal suture), their distinctly wider mesostigmal lamina, and the greater extent of pale color on the sides of abdominal segments 3-7, for in *difficilis* ♀ these segments have a second, or inferior, lateral black stripe, as on segment 2, and this may be more or less fused with the superior lateral, fusion being greater on the posterior segments and increasing with age. This inferior lateral black stripe is absent from *hasemani* ♀.

51. **Argia tamoyo** sp. nov.

(PLATE IV, FIGS. 73, 73s.)

♂. Rear of the head black, a narrow pale stripe along each eye-margin. Pale (violet) antehumeral stripe at mid-height three-fifths as wide as the black mid-dorsal. Black humeral stripe at mid-height three-fourths as wide as the pale antehumeral, wider at both ends, upper fourth forked, both branches of the fork reaching to the upper margin of the sclerite, mesepimeral branch distinctly curving backward (caudad) to reach the vestige of the first lateral thoracic suture. A narrow black stripe on the entire length of the second lateral thoracic suture. Dorsum of abdominal segment 2 violet, the width of the violet being about half that of the segment, bounded on each side by a black stripe as long as the segment, apparently meeting its fellow of the opposite side on the dorsum in the hindmost third of the segment; 3-7 black, with a narrow transverse basal pale ring which on 3 is confluent with a mid-dorsal violet stripe, tapering posteriorly to about half the length of the segment; 8-10 blue, with an inferior black stripe on each side as long as the segments, 8 also with a pair of dorsal spots on the posterior half of the segment, each spot tapering cephalad.

Wings slightly smoky, stigma on the front and on the hind wing surmounting one cell. Antenodal cells 4 on all wings.

Abdomen 29, hind wing 21.5 mm.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

The specific name proposed is that of a native human tribe.

The single specimen (type) has lost all of the left hind wing and a large part of the left front.

52. *Argia smithiana* sp. nov.

(PLATE IV, FIGS. 64, 74, 74s.)

♂. Rear of head chiefly black, a fairly wide pale stripe along each eye-margin, its upper end prolonged mesad as a narrower stripe behind the black, which bounds the postocular spots posteriorly. Black of the frons not reaching as far down as the base of the antennæ, first antennal joint pale anteriorly, a black line on the fronto-nasal suture, rhinarium dark. Pale (violet) antehumeral stripe at mid-height one half as wide as the black mid-dorsal. Black humeral stripe of subuniform width, or a little wider at the two ends, at mid-height equal in width to, or one and one-fourth times as wide as the pale antehumeral, its upper third to two-fifths forked, both branches reaching the upper margin of the sclerite, humeral branch much narrower than the mesepimeral, which curves backward (caudad) to reach the upper end of the obsolete first lateral thoracic suture. A black line on the second lateral thoracic suture down to the metinfraepisternum. Dorsum of abdominal segment 2 violet, a black stripe on each side as long as the segment, widening mesad a little before the hind end of the segment, but not meeting its fellow of the opposite side on the dorsum, and again narrowing; dorsal violet at its widest about two-thirds (or three-fourths, young) as wide as the segment; side of the segment below the above-mentioned black stripe pale, with an ill-defined longitudinal black stripe confluent at one or two points with the superior stripe and also at the hind end of the segment with a narrow black stripe, which margins the side of the segment inferiorly; these last two stripes rudimentary in young individuals. Segments 3-7 black, a narrow pale (blue or violet) transverse basal ring, which on 3-4 or 6 is confluent with a mid-dorsal blue-violet stripe reaching to four-fifths or five-sixths of 3, half to three-fourths of 4, one eighth to one half of 5, one eighth of 6, or absent on 5 and 6, narrowing posteriorly; in mature individuals the sides of 3-7 are entirely black, or with only a small trace of pale color at three-fourths' length on 3-6, but younger individuals show that this black is due to a fusion of the wider superior black with an originally separate inferior black line extending from just behind the pale transverse basal ring to about two-thirds of each segment's length; 8-10 blue, with an inferior black stripe on each side as long as the segments.

♀. Differs from the male as follows: A pair of indistinct dark spots on the nasus, pale antehumeral stripe blue in some, the forking of the



black humeral stripe may affect the upper half thereof; superior black stripe of abdominal segment 2 not narrowed at its hind end, except when the right and left stripes meet on the dorsal and separate the dorsal violet into a larger anterior and a smaller posterior spot, side of this segment chiefly yellowish, with only a short oblique blackish streak at the hind end; mid-dorsal blue on 5 and 6, very narrow, but reaching to four-fifths of 5, three-fifths of 6; inferior line on the sides of 3-7 in younger individuals very faint on 3-6, black, and not fused on 7, in older females black, and fused with the superior black at the hind end only of 3-5 or 6, or at both fronts and hind ends of 6 and 7, or for the whole length on 7; 8 and 9, in addition to the inferior black stripe on each side as in the male, have a pair of dorsal black stripes, pointed posteriorly, reaching from the anterior end of each segment to three-fifths of 8 and to one-half of 9, barely confluent with each other at the extreme base of 8 only, not confluent with the inferior stripes on 8 and barely so on 9; 10 may have an inferior lateral black stripe as in the male, or only a small lateral spot, or no markings.

♂♀. Stigma of the front wings surmounting more than one (75 per cent. ♂, 80 per cent. ♀), one (15 per cent. ♂, 20 per cent. ♀), or less than one (10 per cent. ♂) cell; of the hind wings surmounting more than one (90 per cent. ♂, 80 per cent. ♀), or one (10 per cent. ♂, 20 per cent. ♀) cell.

Antenodal cells on the front wings 3 (90 per cent. ♂, 100 per cent. ♀) or 3 + (10 per cent. ♂); on the hind wings 3 (95 per cent. ♂, 100 per cent. ♀) or 2 (5 per cent. ♂). Percentages based on 10 ♂, 10 ♀.

*Dimensions.* Abdomen ♂ 25-28, ♀ 22-26; hind wing ♂ 18.5-20, ♀ 17.5-21 mm.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 8 ♂ and parts of 9 others, some dated May, some numbered 165, 118, 4 ♀ and parts of 9 others some numbered 165. Carnegie Museum, Pittsburgh.

### 53. *Argia thisma* sp. nov.

(PLATE IV, FIGS. 75, 75a; PLATE VIII, FIG. 144.)

♂. Rear of the head black, a pale stripe along each eye-margin. Pale (violet) antehumeral stripe one-half to one-third as wide as the black mid-dorsal. Black humeral stripe of subuniform width, one and a half to two times as wide as the pale antehumeral, forked only in its extreme upper end, both the humeral and the mesepimeral branch of the fork reaching to the upper margin of the sclerite. A black line or

narrow stripe on the entire length of the second lateral thoracic suture. Dorsum of abdominal segment 2 violet, bounded on each side by a black stripe, which reaches from end to end of the segment and is slightly widened at five-sixth's length and again narrowed to its hind end; the mid-dorsal violet at its widest is one and a half to two times as wide as either lateral black stripe at the same level; below this black stripe each side of the segment is yellowish, or bluish, with an oblique blackish stripe running forward from the hind margin as far as the middle; 3 is chiefly violet in dorsal view, with a narrow black stripe on each side, beginning shortly behind the base and widening on the hindmost fourth or fifth to meet its fellow of the opposite side on the dorsum; 4-7 black with some metallic reflection, each with a narrow transverse basal pale ring, which on 4 is continuous with a mid-dorsal longitudinal violet line or stripe reaching to two-thirds or less of the segment's length; 8 and 9 pale, violet or blue, with an inferior black stripe on each side as long as the segments; 10 black, its hind edge narrowly pale, deeply emarginated mid-dorsally to half, or nearly half, the segment's length, and produced backward over each superior appendage as an acute process. Inferior lateral margins of 3-6 or 7 pale yellow, or blue, except in the hindmost sixth of each segment.

Stigma of the front wings surmounting less than one (78 per cent.), one (11 per cent.) or more than one (11 per cent.) cell; of the hind wings surmounting less than one (72 per cent.) or one (28 per cent.) cell; on all the wings the distal edge is more oblique than the proximal, but more so on the hind pair.

Antenodal cells on the front wings 3 (94.5 per cent.) or 2 (5.5 per cent.); on the hind wings 3 (89 per cent.), 3 + (5.5 per cent.), or 2 (5.5 per cent.).

$M_2$  (= nodal sector of de Selys) arising on the front wings nearest the sixth (89 per cent.) or seventh (11 per cent.) postnodal; on the hind wings nearest the fifth (89 per cent.), sixth (5.5 per cent.) or midway between these two (5.5 per cent.). (Percentages in these three sentences based on the 9 ♂ from Chapada.)

♀ unknown.

*Dimensions.* — ♂. Abdomen 20-22.5; hind wing 14-15.5 mm. (That from Sapucay is larger: abd. 23, h. w. 17 mm.)

*Habitat:* — BRAZIL, Chapada, by H. H. Smith, 8 ♂ and part of 1 other. Carnegie Museum, Pittsburgh. PARAGUAY, Sapucay, by W. T. Foster January 16, 1903, 1 ♂. U. S. National Museum.

The specific name proposed is an anagram from the name of the collector with a terminal *a* added for euphony.

*Argia thisma* vies with *A. bipunctulata* Hagen of North America as the smallest known species of the genus. It closely approaches the description of *A. lilacina* Selys, also of Brazil, which latter, however, is stated to have the abdomen ♂ 26 mm., hind wing ♂ 19–20 mm., rear of the head yellow, a yellowish lilac antehumeral band almost forked above, the black line on the second lateral thoracic suture incomplete, the first seven abdominal segments clear blue violet, 3–7 with a thick terminal black ring.

In spite of its small size *A. thisma* preserves a character of the genus which on *a priori* grounds might have been expected to disappear, *i. e.*, the origin of  $M_2$  (nodal sector) is still as far distad as the sixth postnodal on the front wings and the fifth on the hind. Stated in another way, enough postnodals are retained to permit of the persistence of this numerical relation to the point of origin of  $M_2$ . (Cf. *Biologia Centr.-Amer.*, Neur., p. 376 under *Argiallagma*.)

#### 54. *Argia jocosa* Hagen.

*Habitat*: — COLOMBIA, Onaca, in Dept. Magdalena, August, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

#### 55. *Argia cupraurea* Calvert.

*Argia cupraurea* Calvert, Biol. Centr.-Amer. Neurop., pp. 85, 371, pl. iv, figs. 24, 42, 1902, 1907.

*Habitat*: — VENEZUELA, La Guaira, by Lyon and Robinson, July 4, 1900, 1 ♂, July 27, 1 ♀; San Julian, July 20, 1900, by M. W. Lyon, Jr., 1 ♂. U. S. National Museum.

#### 56. *Argia orichalcea*.

*Argia orichalcea* Hagen, Bull. Acad. Belg. (2), xx, p. 408, 1875. Calvert, Biol. Centr.-Amer. Neurop., pp. 71, 86, 1901. Hagen and Calvert, Bull. Mus. Comp. Zoöl. xxxix, p. 113, pl. 1, figs. 7, 7a (apps. ♂), 1902.

♂. The original description of this species states, abdominal segments “3me–6me avec une tache basale bleu foncé occupant presque la moitié au-dessus” and implies that segments 8 to 10 are as in *cuprea*, *i. e.*, 8 black, narrowly pale blue at base, 9 and 10 greenish-blue above. In the *Biologia*, *l. c.* I have given these markings as distinguishing *orichalcea* from *ænea*, stating, however, that I had not seen *orichalcea*. Material from Bonda, Colombia, listed below,

although evidently closely allied to *orichalcea* and *ænea*, does not exactly agree with the diagnosis of either of these species, since segments 3-7 are black with a blue transverse basal ring occupying only one-fifteenth of the segments' lengths, and 8, while badly faded in most of the examples, is in others unquestionably blue, with an inferior black stripe each side of variable length, 9 blue with an inferior black stripe each side as long as the segment, 10 similar, or with the black stripe reduced to a spot.

♀. Agrees with the original description of *orichalcea* ♀ except that the mesepimeral branch of the humeral stripe ("bande posthumérale noir bronzé métallique") reaches the short black line on the upper end of the obsolete first lateral thoracic suture in all but one or two examples. I cannot distinguish these females from *ænea* ♀, for, although they seem to have a narrower mesostigmal lamina, I find on re-examining a series of *ænea* females that considerable variation in the width of this structure exists in that species.

*Dimensions* : abdomen ♂ 26.5-30, ♀ 24-27 ; hind wing ♂ 18.5-21, ♀ 19-21 mm.

*Habitat* : — COLOMBIA, Bonda in Dept. Magdalena, by H. H. Smith, 1 ♀ June, 2 ♂ July, 12 ♂ 14 ♀ August, 2 ♂ 1 ♀ September, 1 ♂ October, 1 ♂ 2 ♀ November. Carnegie Museum, Pittsburgh.

I refer these specimen to *orichalcea*, notwithstanding the above-mentioned differences, pending a re-examination of the types.

### 57. *Argia tinctipennis* Selys.

(PLATE IV, FIG. 62.)

*Argia tinctipennis* (Bates, Mss.) Selys, Bull. Acad. Belg. (2) xx, p. 396. 1865.  
Hagen & Calvert, Bull. Mus. Comp. Zoöl., xxxix, p. 115, pl. 2, ff. 6, 6a. 1902.

♂. The black of the frons extends down between the antennæ (but not on the genæ) to the nasus, which latter is blue. At mid-height the pale (blue) antehumeral stripe is one-half to two-fifths as wide as the black mid-dorsal, the black humeral stripe one and one-half times as wide as the pale antehumeral. The intersegmental articulation of 9 and 10 is black.

♀. Agreeing with de Selys' description except that the pale colors are pale browns or blues instead of "jaune olivâtre" or "jaunâtre," differences doubtless due to differences of age. As in the male, the black of the frons extends down between the antennæ (but not on the genæ) to the nasus, but the latter is also black. At mid-height the

pale antehumeral stripe is one-third to one-fourth as wide as the black mid-dorsal, the black humeral  $1\frac{1}{4}$  to  $1\frac{1}{2}$  times as wide as the pale antehumeral. The black markings of 8 and 9 are due to the two mid-dorsal stripes, which extend from the base to two-thirds or four-fifths of the length of 8 and to one-half of the length of 9, having fused each with its adjacent inferior lateral black stripe for the first half to three-fifths (on 8) or third (on 9) of the segment's length, while the dorsals have fused with each other for almost their entire length on 8, although only at the extreme base on 9. The inner, or mesial, end of each mesostigmal lamina is produced caudad as a slight carina, parallel to the median sagittal plane of the body, as far as the level of the lower (anterior) forking of the mid-dorsal thoracic carina; this feature is not found in the females referred to *A. botacudo*.

♂♀. Stigma of the front wings surmounting more than one cell (100 per cent. ♂, 66.7 per cent. ♀) or one cell (33.3 per cent. ♀); of the hind wings surmounting more than one (50 per cent. ♂, 83 per cent. ♀), one (33 per cent. ♂, 17 per cent. ♀), or less than one (17 per cent. ♂) cell.

Antenodal cells on the front wings 3 (100 per cent. ♂♀), on the hind wings 3 (100 per cent. ♂, 83 per cent. ♀) or 3 + (17 per cent. ♀).

Postnodals on the front wings 15 (50 per cent. ♂, 33.3 per cent. ♀), 16 (33.3 per cent. ♂, 50 per cent. ♀), 14 (17 per cent. ♂) or 17 (17 per cent. ♀). All percentages based on 3 ♂ 3 ♀.

*Dimensions*: abdomen ♂ 26-26.5, ♀ 23.5-25; hind wing ♂ 18.5, ♀ 18-19.5 mm.

*Habitat*:—BRAZIL, Peixe-Boi, by Miss Harriet B. Merrill, 3 ♂ 3 ♀. Academy of Natural Sciences of Philadelphia and coll. E. B. Williamson. Two of the males and one female are accompanied by the following notes made by the collector: ♂ "Bright blue, darker than sky blue Nov. 26, 1907"; ♂ "Entire body blue and black Nov. 26, 1907"; ♀ "Bright blue like larger one Nov. 29, 1907."

After describing the "♀? (Douteuse)" of *Argia impura*, Selys (*l. c.* p. 397) remarks "J'ai été porté à admettre une différence entre *l'impura* et la *tinctipennis* parce que les deux femelles, qui semblent notablement différentes l'une de l'autre, se rapportent parfaitement par les dimensions et le nombre de nervules postcubitales aux mâles que j'y rapporte." The color pattern of abdominal segments 4 and 5 of the males as he describes them would appear to justify the separation of

*impura* and *tinctipennis*, but the "notable differences" between the two females do not appear from his description, as the dimensions given for them are exactly alike (abdomen 23, hind wing 19 mm.), and the number of postnodals (postcubitals) for the male of *tinctipennis* is not stated. From the data which are given above for *tinctipennis*, it seems possible that de Selys' *impura* female may also be *tinctipennis*.

58. *Argia chapadæ* sp. nov.

(PLATE IV, FIGS. 76, 76s.)

♂. Rear of the head black, with a narrow pale stripe along each eye, margin. Black of the frons not reaching as far down as the level of the first joint of the antennæ, which joint is blue anteriorly; fronto-nasal suture with a black line. Pale (blue) antehumeral stripe widening from above downward, at mid-height one-half to two-fifths as wide as the black mid-dorsal. Black humeral stripe widened at both ends, at the lower end as wide, at mid-height three-fourths as wide, as the pale antehumeral, forked in its upper fourth or two-fifths, both branches reaching to the upper margin of the sclerite, the mesepimeral branch noticeably curving backward (caudad) to attain also the upper end of the obsolete first lateral thoracic suture. A narrow black stripe on the entire length of the second lateral thoracic suture or obsolete on the lower half thereof. Abdominal segment 2 blue, a black stripe on each side from end to end of the segment, curving mesad just in front of its hind end toward, but not meeting, its fellow of the opposite side on the dorsum; side below this stripe blue, unmarked; the dorsal blue of the anterior part of the segment two-thirds to four-fifths as wide as the segment itself; 3-6 predominantly blue in dorsal view, each with a longitudinal black stripe on each side beginning just behind the usual transverse basal blue ring and widening to meet its fellow of the opposite side on the dorsum in the hindmost fifth or sixth of each segment (or in some the fourth of 6); 7 black with a narrow transverse basal blue ring, mid-dorsally interrupted with black; inferior lateral margins of 3-7 blue, except in the hindmost sixth of each segment; 8-10 blue, with an inferior black stripe on each side as long as the segments.

♀. A single female seems to belong to this species. It differs from the male as follows: Nasus black, a small pale spot on each side, black of the frons reaching down between the antennæ to the level of their bases (first antennal joint remaining pale anteriorly) and connected

by a median perpendicular black line with the black of the nasus; black humeral stripe similar to that of the male, but not so narrow in its middle where it is subequal in width to the pale antehumeral, the black stripe obsolete on the lower half, or more, of the second lateral thoracic suture; dorsal blue of the anterior part of abdominal segment 2 narrower, one-half to one-third as wide as the segment; 3-5 predominantly black in dorsal view, the lateral black stripes wider, so that the mid-dorsal blue is reduced in width to one-third of that of the segment on 3 and 4 and to hardly more than a line on 5, and not confluent with the transverse basal blue ring on 4 and 5, as the ring is mid-dorsally interrupted with black; 6 like 7 of the male; 8 and 9 similar to those of the male, but having in addition a pair of black dorsal stripes extending from the base of each segment to three-fourths of 8, three-fifths of 9, each dorsal fused with its adjacent inferior lateral for the first half of 8 or third of 9, and with its fellow dorsal at the extreme base of 8, but not on 9; hind ends of the dorsals narrower and rounded; 10 blue, with a transverse basal black line, posterior dorsal margin of the segment narrowly cleft on the median line almost to the base of the segment. Prothorax and mesostigmal laminae lost.

♂♀. Stigma of the front wings surmounting more than one (55 per cent. ♂, right wing ♀) or one (45 per cent. ♂, left wing ♀) cell; of the hind wings surmounting more than one (50 per cent. ♂, left wing ♀), one (45 per cent. ♂, right wing ♀), or less than one (5 per cent. ♂) cell.

Antenodal cells of the front wings 3 (80 per cent. ♂, and ♀) or 3 + (20 per cent. ♂), of the hind wings 3 (100 per cent. ♂, ♀). The percentages are based on 10 ♂.

*Dimensions*: abdomen ♂ 25.5-26, ♀ 24; hind wing ♂ 18-20, ♀ 19 mm.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 2 ♂ and parts of 9 others, 1 ♀. Carnegie Museum, Pittsburgh.

This species is very similar to *A. tinctipennis* Selys and may be a subspecies (geographical race) thereof, but the intermediates are not at hand. The chief differences are that *A. tinctipennis* has the black of the frons extending down to the nasus; the black humeral stripe of uniform width (not narrower in the middle, as in *chapadæ*), wider in that it extends over the whole of the mesepimeron (instead of reaching to the obsolete first lateral thoracic suture at its upper end only), and not forked, although enclosing a pale dot at its upper end; the

black stripe on the second lateral thoracic suture wider and complete. In *tinctipennis* ♀, in addition, the mid-dorsal blue on abdominal segments 3 and 4 is a mere fine line, while in *chapadæ* ♀ it forms a stripe of some width. The wings of the present material of *chapadæ* are only very slightly yellowish, or smoky, but this may be only an age-difference, as de Selys accepts it as such in his description of *tinctipennis*.

59. *Argia botacudo* sp. nov.

(PLATE IV, FIGS. 63, 77, 77s.)

♂. Rear of the head black, a narrow yellow stripe along each eye-margin. Pale antehumeral stripe at mid-height two-fifths as wide as the black mid-dorsal. Black humeral stripe of subuniform width, one and one-half times as wide as the pale antehumeral, not forked, but enclosing a very small pale spot at its upper end. A black stripe on the entire length of the second lateral thoracic suture. Abdominal segment 2 violaceous, a longitudinal black stripe on each side from end to end, approaching, but not meeting, its fellow of the opposite side on the dorsum a little in front of the hind end of the segment, the violaceous area on the anterior dorsal part of the segment half to three-fifths as wide as the segment itself, the lateral black stripe reaching down to the inferior margin at mid-length of the segment and again at the hind end, or for most of the posterior part of the segment. Abdominal segments 3 and 4 chiefly violaceous in dorsal view, each having a lateral black stripe on each side beginning just behind the usual transverse pale basal ring and widening on the hindmost fourth to sixth of the segments to meet its fellow of the opposite side on the dorsum; segment 5 similar, but since the lateral black stripes meet on the hindmost third or fourth of the segment, and the mid-dorsal violaceous is narrower and tapers to a more acute point posteriorly, black predominates on this segment in dorsal view; 6 and 7 black with a narrower transverse pale basal ring; inferior lateral margins of 3-6 or 7 pale yellowish, or brownish, except in the hindmost fifth of each segment; 8-10 violaceous, with an inferior black stripe each side as long as the segments, and apparently reaching farther up toward the dorsum at the hind end of 8 than at any other point.

♀. Differs from the male as follows: Nasus black with a small pale spot on each side; the black of the frons extends to the nasus in one specimen only (in the males the nasus is blue, the fronto-nasal suture, the rhinarium, and the base of the labrum are narrowly black); pale



antehumeral stripe one-fourth to two-fifths as wide as the black mid-dorsal at mid-height, black humeral stripe nearly twice to one and one-half times as wide as the pale antehumeral; the violaceous area on the anterior part of the dorsum of abdominal segment 2 reduced in width to about one-third of that of the segment, the lateral black stripe not reaching to the inferior margin, but there is an elongated isolated brown spot on the posterior half of the yellowish side of the segment; 3 and 4 chiefly black, the mid-dorsal pale stripe much reduced in width, although of about the same length; 5-7 black, with a mid-dorsal pale line from base backward (caudad) to five-sixths (on 5) or one-half (on 7) of the length of the segments; 8 and 9 with black predominating in the form of four longitudinal stripes, two dorsal, and an inferior on each side, all four reaching from end to end of segment 8 (or the two dorsals interrupted at three-fourths' length), all four fused at base and at apex, the basal fusion between each lateral and its adjacent dorsal extending for the anterior two-thirds of the segment; on 9 the inferior lateral black stripes reach from end to end of the segment, the dorsals from base to two-thirds of the length, each dorsal being fused with its adjacent lateral for the basal half or third of the segment, but with its fellow dorsal only at the extreme base; 10 pale, with a narrow transverse basal black stripe, the posterior margin of the segment cleft mid-dorsally and narrowly for almost the whole length of the segment.

♂♀. Stigma of the front wings surmounting more than one (75 per cent. ♂, 83 per cent. ♀) or one (25 per cent. ♂, 17 per cent. ♀) cell; of the hind wings surmounting more than one (85 per cent. ♂, 66.7 per cent. ♀) or one (15 per cent. ♂, 33.3 per cent. ♀) cell.

Antenodal cells on the front wings 3 (80 per cent. ♂, 100 per cent. ♀) or 4 (20 per cent. ♂); on the hind wings 3 (100 per cent. ♂, 83 per cent. ♀) or 2 (17 per cent. ♀). Percentages based on 10 ♂, 3 ♀.

*Dimensions*: abdomen ♂ 24-26.5, ♀ 23.5; hind wing ♂ 18-19.5, ♀ 19-20 mm.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 5 ♂ (and parts of 10 others), 2 ♀ (and parts of 1 other), 1 ♂ 1 ♀ each numbered 85, other males numbered 83 and 149, females 78 and 188 by the collector. Carnegie Museum, Pittsburgh.

The specific name proposed is that of a tribe of Brazilian Indians.

The postocular spots of both sexes of this species are rather distinc-

tive, being smaller than is often the case in this genus, not so elongate mesad, and with no pale transverse occipital stripe between the right and left spots.

60. *Argia tupi*, sp. nov.

(PLATE IV, FIGS. 78, 78s.)

♂. Rear of head chiefly black, a narrow yellowish stripe bordering each eye and a narrow transverse superior yellowish stripe each side immediately behind the black, which borders posteriorly each pale post-ocular spot, the yellowish stripe subequal in width to this black. Pale (violet) antehumeral stripe twice as wide as the black mid-dorsal. Black humeral stripe a mere line in its upper two-thirds, but widened at its upper end, in its lower third confluent with an oblique black mesepimeral stripe. This latter stripe reaches to the upper margin of the mesepimeron; in its lower third it is half, or a little more than half, as wide as the pale antehumeral. A black stripe on the whole length of the second lateral thoracic suture. Abdominal segment 2 violet on dorsum bounded on each side by a black stripe, which is widened mesad at three-fourths' length and again narrowed before the hind end of the segment, but does not meet its fellow of the opposite side; sides of 2 below this stripe yellowish, with the posterior two-thirds of the inferior margin black; 3-6 violet, with a black stripe on each side beginning shortly behind the base of each segment and reaching to the hind end and widened mesad to meet its fellow of the opposite side in the hindmost fifth of 3, fourth of 4, two-fifths of 5, half of 6; 7 black, with a narrow transverse basal pale ring; the lateral black of 3-7 encloses a longitudinal pale brownish or yellowish stripe the length of which may be half, or more than half, of that of the segment; 8-10 pale (blue?) with an inferior black stripe on each side for the entire length of each segment.

Stigma of the front wings surmounting more than one cell; of the hind wings surmounting more than one cell (75 per cent.), two cells (12.5 per cent.) or more than two cells (12.5 per cent.).

Antenodal cells on the front wings 4 (87.5 per cent.) or 4 + (12.5 per cent.), on the hind wings 4 (87.5 per cent.) or 3 + (12.5 per cent.). (Percentages here and in preceding paragraph based on 4 ♂.)

♀ unknown.

*Dimensions*: ♂. Abdomen 29.5-33.5; hind wing 23-26 mm.

*Habitat* :— BRAZIL, Chapada, by H. H. Smith, 4 ♂, one dated May. Carnegie Museum, Pittsburgh.

The specific name proposed is that of a native human tribe.

This species belongs to the same group as the Mexican and Central American species *harknessi*, *barretti*, *pipila*, and *chelata* of the "Biologia Centrali-Americana," Volume Neuroptera, and in the key to the species therein (*l. c.* pp. 71, 359) comes nearest to *chelata*. It differs from *chelata* in its smaller size, fewer antenodal cells on the front wings, in the details of the abdominal appendages, the smaller extent of pale color (here violet) on the abdomen, the black humeral stripe forked in its upper two-thirds, the mesepimeral constituent of the fork reaching to the upper margin of the mesepimeron, which is not the case in *chelata*.

Among the described South American species, *tupi* seems to approach *clausenii* Selys and *croceipennis* Selys. From the description of the first it appears to differ by the absence in all four examples of any double cells in the second cubital area (= espace postcostal of de Selys), in having fewer black bands on the thorax, and less pale color on the abdomen, especially on segment 7; the details of the abdominal appendages are also different from Hagen's figures of those of *clausenii*. (Bull. Mus. Comp. Zoöl. XXXIX, 1902.)

The description of *croceipennis* calls for an insect having, *inter alia*, its wings "entièrement lavées de jaunâtre safrané, . . . devant du thorax noir, avec une bande antéhumérale bleue arquée [which I interpret to mean that black predominates on this area]. . . . Abdomen noir luisant, marqué de bleu ainsi qu'il suit : . . . 7me-8me à anneau basal non prolongé," which characteristics appear to exclude the form here described as new.

#### 61. *Argia subapicalis* sp. nov.

(PLATE IV, FIGS. 79, 79s.)

♂. Rear of the head black, a pale stripe bordering the eyes below; one ♂ shows also a superior transverse yellowish stripe similar to that described for *A. tupi*. Black mid-dorsal thoracic stripe reduced to a line upon the carina only. Black humeral stripe little more than a line for most of its length, slightly wider in its upper half, especially just below its upper end, at its lower end confluent with a sub-quadrangular mesepimeral black spot, similar to, but wider than the spot in the same area in *A. apicalis* Say of North America,

and which is continued upon the mesinfraepisternum. A black stripe on the second lateral thoracic suture down to the level of the metastigma. Abdominal segment 2 blue, becoming violet with age, with a black stripe on each side from end to end, widened mesad at about four-fifths' length, so as to approach, but not to meet, its fellow of the opposite side on the dorsum, and again narrowed to the hind end; 3-7 predominantly black, with a narrow transverse basal pale (violet in older examples) ring, which on 3 is produced backward on the dorsum, tapering posteriorly to four-fifths or two-thirds of the segment's length, and on 4 is similarly produced for the first eighth or tenth of the segment's length; on the sides of 3-6 or 7 the pale basal ring is produced as a pale stripe along the inferior margin to about five-sixths of the length of each segment; 8-10 pale (blue?) with an inferior black stripe on each side as long as the segments; in at least one specimen the black stripe on each side of 8 is produced upon the dorsum at the hind end of the segment, and meets its fellow of the opposite side.

Stigma of the front wings surmounting more than one (60 per cent.), one (20 per cent.) or less than one (20 per cent.) cell, long; of the hind wings surmounting more than one (50 per cent.), one (40 per cent.), or less than one (10 per cent.) cell.

Antenodal cells on the front wings 4 (90 per cent.) or 5 (10 per cent.), on the hind wings 4 (80 per cent.) or 5 (20 per cent.). (Percentages in this and in the preceding paragraph based on 5 ♂.)

♀ unknown.

*Dimensions*; ♂. Abdomen 28-31.5; hind wing 19-23 mm.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 3 ♂ and parts of 2 others. Carnegie Museum, Pittsburgh.

This species shows a remarkable resemblance to *A. apicalis* Say of North America, which latter is not known south of Texas. *Apicalis* differs in the following peculiarities: the rear of the head is chiefly pale; the black on the upper surface of the head extends no farther forward on the middle line than the median ocellus, and the first antennal joint is pale (blue), (in *subapicalis* the black of the upper surface of the head reaches at least as far forward along the median line as the anterior limit of the antennal bases, and is in some examples produced as far as the fronto-nasal suture, and the first antennal joint is black); there is no black stripe on the second lateral thoracic suture, the mid-dorsal longitudinal pale area on abdominal segment 2 is merely a

narrow stripe (in *subapicalis* it is nearly as wide as the segment, when seen in strictly dorsal view), there is a pale blue or yellow mid-dorsal longitudinal line or narrow stripe, which does not taper, on 3-6 reaching from the transverse basal ring to three-fourths or more of the length of each segment; the superior abdominal appendages are shorter, both absolutely and relatively, the inferior appendages have the branches of the bifid apex less divergent and of equal length.

62. **Argia iralai**, sp. nov.

(PLATE IV, FIG. 65.)

♀. Rear of the head yellowish, a small black streak on each side of the occipital foramen, anterior surface of the first, and of part of the second antennal joints pale (ochreous), black of the frons not reaching down as far as the base of the antennæ, a black line on the fronto-nasal suture. Pale antehumeral stripe at mid-height very slightly wider than half to three-fifths as wide as the mid-dorsal black. Black humeral stripe at mid-height half as wide as the pale antehumeral, slightly forked, or not so at its lower end, forked in its upper three-fifths to two-fifths, humeral branch mostly linear, mesepimeral branch wider, curved backward (caudad) at its upper end to reach the short black line on the upper end of the obsolete first lateral thoracic suture. Second lateral suture with a black line on its upper part, or all the way down to the metinfraepisternum. Dorsum of abdominal segment 2 violet, with a black stripe on each side as long as the segment, widening mesad before the hind end of the segment, but not meeting its fellow of the opposite side on the dorsum, and again narrowing to its hind end; dorsal violet at its widest half as wide as the segment itself; side below the black stripe yellowish, without distinct dark markings. Segments 3-7 black, with a narrow transverse pale basal ring confluent with a pale mid-dorsal narrow stripe on 3-5, or line on 6, nearly as long as each segment; sides of 3-7 inferiorly pale, except for a blackish spot at the hind end of each; 8 with a wider dorsal and a narrower inferior longitudinal black stripe on each side, all as long as the segment, the two dorsals nearer to each other than either is to the adjacent inferior, confluent with each other anteriorly, but not with the inferiors; 9 similarly marked except that the two dorsals reach only to two-thirds of the segment's length, and are not confluent, the inferior stripe may be broken into spots; 10 pale, with only a small basal lateral black spot.

Wings pale brownish-yellow, stigma surmounting more than one cell (83.3 per cent. of both front and hind wings).

Antenodal cells on the front wings 4 (83.3 per cent.) or 5 (16.7 per cent.), on the hind wings 4 (100 per cent.). Percentages based on 3 ♀.

*Dimensions.* Abdomen 27–29; hind wing 23–24 mm.

♂ unknown.

*Habitat*: — PARAGUAY, Sapucay, by W. T. Foster, November, 1899, three females, two of them numbered 16, the third 20 by the collector (others numbered 16 are *Argia fosteri*). U. S. National Museum.

The specific name is in honor of Domingo Irala, founder of Asuncion.

The mesostigmal lamina of this species is fairly large and strong, its inner (mesial) end continued as a flattened ridge, which is directed caudad, lies external to the fork of the lower (anterior) end of the mid-dorsal thoracic carina, and gradually merges with the mesepisternal surface anterior to the level of the forking of the mid-dorsal carina; the lamina itself is almost exactly transverse and its crest is largely yellowish; the continuation of the lamina as described above is paralleled in the female of *A. tinctipennis*, *q. v.*

A mesostigmal lamina very similar to that of *iralai*, except that it is entirely black, is found in a female from Cachoeira, Brazil, by H. H. Smith (no. 27), in the Carnegie Museum. This female, which may be merely an older individual of *iralai*, has the black of the frons reaching to the level of the antennæ-bases, second antennal joint black anteriorly, nasus obscure blackish, dorsal violet of abdominal segment 2 narrower, an inferior longitudinal brown or black line extending forward from the blackish spot at the hind end of 3–7 almost to base, dorsal black stripes on 9 confluent at anterior end of the segment.

Abdomen 26, hind wing 21.5 mm.

#### DIARGIA, gen. nov.

Biserial hairs or spines of the basal halves of the second and third tibiæ twice as long as the intervals separating them, tarsal nails with an inferior tooth. Vein A (= inferior sector of the triangle of de Selys\*) separating from the hind margin of the wing at least as far proximad to the cubito-anal cross-vein (= postcostal cross-vein of de Selys) as the latter is long. Arculus at the second antenodal. Quad-

\* Cf. Biol. Centr.-Amer. Neurop. p. 133, footnote †.

rilateral on the front wings with the anterior side less than half as long as the posterior side, on the hind wings the anterior side more than half, or half, as long as the posterior side.  $M_2$  (= nodal sector of de Selys) arising nearest the fifth postnodal on the front wings, the fifth or fourth on the hind. Pterostigma and venation similar on front and hind wings in both sexes. Abdominal appendages of the male similar to those of *Argia i. e.* the superiors transversely, the inferiors vertically, bifid. No ventral posterior spine on abdominal segment 8 of the female.

Type: *Diargia bicellulata*, sp. nov.

This genus is closely related to *Argia* from which it differs in the smaller number of biserial tibial hairs or spines (5-6 on outer side of third tibia), the more proximal origin, as measured by number of postnodals, of vein  $M_2$  and, in so far as the only known species is concerned, by possessing but *two* antenodal ultraquadrilateral cells. From *Argiallagma* Selys (*cf.* Calvert, Biol. Centr.-Amer. Neurop., p. 376) it differs by the argiaform appendages of the male, the absence of a vulvar spine in the female, and by the smaller number of antenodal cells.

Of the species of *Argia* known to me, *Diargia* most closely approaches *Argia thisma*, described as new in the present paper, page 141, under which heading will be found some details for comparison with *Diargia bicellulata*.

### 63. *Diargia bicellulata*, sp. nov.

(PLATE IV, FIGS. 67, 68, 68s; PLATE VIII, FIG. 141.)

♂. *Black* with the following parts *pale yellow* or *blue*: first antennal joint anteriorly and all of the face and lips below the level of the second joint of the antennæ, a cuneiform postocular spot on each side and a transverse occipital line connecting them, a narrow line bordering the eyes posteriorly, front lobe of the prothorax and the sides of the other two lobes, an antehumeral stripe which at mid-height is one-sixth as wide as the black mid-dorsal, a metepisternal stripe and a metepimeral stripe, neither of which is quite as wide as the black humeral (mesepimeral) stripe, or as the black stripe present on the entire length of the second lateral thoracic suture, an oval dorsal (blue) spot on abdominal segment 2, a narrow transverse basal ring on 3-7 confluent with a mid-dorsal line or narrow stripe on 3-5 or 6, reaching the greater part of the length of each segment, sides inferiorly of 3-6

in the anterior two-thirds of each, femora inferiorly, tibiæ superiorly. Abdominal segments 8 and 9 blue, with an inferior black stripe on each side occupying the greater part of the length of each segment. Hind margin of abdominal segment 10 with a mid-dorsal excision. Superior appendages not quite as long as 10, extreme apex bifid transversely, inner branch longer. Inferior appendages a little longer than 10, vertically bifid, upper branch the longer and more robust, directed upward; lower branch shorter, slenderer, more acute, directed backward (caudad).

*Younger males* differ from the above description in having the markings of abdominal segment 2 more distinctly argiaform, in that there is a superior black stripe on each side contracting posteriorly to three-fifths its length, thence widening to its hind end, not reaching the hind margin of the segment, and failing to unite with its fellow of the opposite side; each side has also an inferior black stripe; the black on the first three-fourths of segments 3 and 4 represented by ill-defined brownish markings.

*Old males* differ from the first description in having a black line on the fronto-nasal suture, a couple of black dots on the rhinarium, a mid-basal black mark on the labrum; the sides and ventral surface of the thorax and the first two abdominal segments show more or less pruinosity; segments 3-6 show some tendency to have the inferior lateral margin blackish ventrad to the pale coloring.

♀. The only example of this sex has the head and abdominal segments 3-6 marked as above described for the old males; segment 2 black dorsally with a very small median blue spot, sides pale yellow with an inferior longitudinal black stripe; 7 similar to 6; 8 pale posteriorly, its black marks consisting of a pair of dorsal stripes reaching from the base backward to two-thirds of the segment's length, confluent with each other for the first third, and each with an adjacent inferior lateral black stripe for the first half of the segment's length; the inferior lateral black stripe extends the whole length of the segment. Segment 9 black, with a single mid-basal, and on each side at three-fourths' length a posterior pale dot; 10 black, its hind margin narrowly pale, cleft mid-dorsally to base, appendages shorter than the segment, black; no vulvar spine.

♂♀. Wings uncolored, iridescent, veins pale reddish at base, darker distally; stigma brown, costal side only slightly longer than the proximal or distal sides, which are subparallel, surmounting usually one cell. Front



wings with 9-12 postnodals (10, 40 per cent. and 11, 35 per cent., more frequently),  $M_2$  (= nodal sector of deSelys) arising nearest the fifth (80 per cent.) or sixth (10 per cent.) postnodal, or midway between (10 per cent.); two (90 per cent.) or three (10 per cent.) antenodal ultraquadrilateral cells. Hind wings with 7-10 postnodals (11, 55 per cent. most frequently);  $M_2$  arising nearest the fifth (45 per cent.), fourth (40 per cent.), or midway between (10 per cent.), or in one wing (= 5 per cent.) nearest the sixth postnodal; two (95 per cent.) or three (5 per cent.) antenodal ultraquadrilateral cells. All percentages based on 9? ♂ 1 ♀.

*Dimensions.* Abdomen ♂ 16.5-20, ♀ 18.5; hind wing ♂ 11.5-13.5, ♀ 14.5.

*Habitat:* — BRAZIL, Chapada, by H. H. Smith, 8 ♂ 1 ♂ and parts of 2 other specimens, some labeled 145, one 77, by the collector. Carnegie Museum, Pittsburgh.

#### 64. *Leptagrion porrectum* ?

*Leptagrion porrectum* Selys, Bull. Acad. Belg. (2) xlii, p. 975. 1876.

*L. porrectum* Selys was described "d'après un exemplaire" from Brazil. The description is in one place,<sup>17</sup> at least, obscure. A male from Rio de Janeiro, in November, by H. H. Smith (Carnegie Museum, Pittsburgh), resembles that description in many respects, but differs in others, so that I am uncertain whether it pertains to the same species or not. The differences are: the longer abdomen 64 mm. (instead of 54), 13 postnodals on the front wing (instead of 14-15), upper surface of the head blue, but with a transverse blackish band .5 mm. wide from eye to eye, the median ocellus and the bases of the antennæ being respectively on the upper and lower margins of this dark band, the first antennal joint having a blue spot anteriorly; hind prothoracic lobe blue, with a reddish spot in the middle; neither the mid-dorsal thoracic carina nor a "juxta-humeral" ray black, only a short black line at the upper ends of the humeral and of the second lateral sutures; a blue antehumeral stripe bordering the humeral suture anteriorly, one-third as wide as the reddish mid-dorsal; abdomen pale ochre-brown, sides of 1 and 2 pale green, extreme base and an anteterminal transverse band of about 1 mm. in width on 3-6 blackish or dark brown, on 3 and 4 this anteterminal band is distinctly separated from the hind end of the segments by a narrower pale ochre ring; 7

<sup>17</sup> *L. c.*, p. 976, lines 25-27.

obscure brownish, 8-10 obscure, possibly pale blue or green in life; superior appendages very slightly longer than 10, 1 mm. long, dark brown; in dorsal view each is about three times as long as wide at base, inclined slightly toward each other, more especially in the distal two-fifths, apex rounded, obtuse; in profile view each superior appendage tapers somewhat from base to the obtuse apex, which bears a rather thick tuft of pale brownish-yellow hairs; at mid-length is an inferior process divided into two branches both directed inward (mesad) and downward (ventrad), the anterior branch also somewhat forward, the posterior branch also hindward (caudad), the anterior branch shorter, slenderer, subcylindrical, the posterior lamellate and expanded at its tip; 7 spines ("cils") on the outer row of the third tibia.

If the appendages of this insect are the same as of Selys' *porrectum*, I think it likely that only one species is concerned in spite of the very considerable color differences, for these latter are not greater than are to be found in that protean form, *Telagrion fulvillum*. If our present male proves to be distinct, the name *perlongum* would be appropriate. Like *porrectum* it is "roussâtre clair . . . à la place ou seraient les taches postoculaires non délimitées en arrière," and it is difficult to see why de Selys did not refer *porrectum* to *Telagrion* instead of to *Leptagrion*.

#### 65. *Leptagrion macrurum* Burmeister.

*Habitat*: — BRAZIL, Rio de Janeiro, by H. H. Smith, November, 1 ♂ and part of one other, December, 1 ♂, parts of 2 ♀. Carnegie Museum, Pittsburgh. Rio de Janeiro, by Reinhart, 1 young ♂; Lagoa Santa [in Brazil?], Lund, 1 ♀; Museum of Comparative Zoölogy, Cambridge, Mass.

There are nine spines on the outer row of the third tibia. Young ♂♀ have the head pale above, including the area occupied by the pale postocular spots of other genera, a black stripe on the occiput, no mid-dorsal thoracic black.

#### 66. *Leptagrion elongatum* Selys.

*Habitat*: — BRAZIL, Rio de Janeiro, in November, by H. H. Smith, 1 ♂, 1 ♀ and part of one other. Carnegie Museum, Pittsburgh.

#### 67. *Enallagma civile* Hagen.

*Enallagma civile* Calvert, Biol. Centr.-Amer. Neurop., pp. 110, 380. 1902, 1907.

*Habitat*: — JAMAICA, Hope Gardens, May 29, 1904, by W. R., Maxon, 8 ♂. U. S. National Museum.

Not previously recorded from Jamaica, although known from Cuba, Hayti, and Porto Rico.

68. *Enallagma cœcum novæ-hispaniæ* Calvert.

*Enallagma cœcum novæ-hispaniæ* Calvert, Biol. Centr.-Amer. Neurop. p. 381. 1907

*Habitat*:—COLOMBIA, Bonda in Dept. Magdalena, August, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

69. *Enallagma ovigerum* sp. nov.

(PLATE VI, FIGS. 123, 123s.)

♂. Dorsal surface of the head blackish, the following *blue*: a large postocular spot each side, lower margin of the frons, genæ, rhinarium, external surfaces of mandibles and labrum. Labrum and rear of head cream-color, or very pale blue. Prothorax obscure blackish, sides and perhaps the front lobe pale blue; hind lobe produced upward as a median quadrangular process, the width of which is greater than its height. Mesothoracic dorsum blackish-brown, a pale blue antehumeral stripe the width of which at mid-height is about one-third of that of the dark mid-dorsal band and somewhat narrower than the humeral stripe, which latter is dark reddish-brown; sides and ventral surface pale blue.

Dorsum of abdominal segments 1–6 black, their sides inferiorly pale blue, green, or yellow, 3–6 also with a narrow transverse basal mid-dorsally interrupted pale ring; 7 chiefly pale blue, with a transverse black band at anterior and at posterior ends, the latter wider, and an inferior lateral longitudinal black stripe on each side connecting the two transverse bands; 8 and 9 blue, 10 black dorsally, ventral surfaces of 1–10 pale blue, or yellow. Hind margin of 10 with a mid-dorsal bilobed process, the height of which is about one-tenth of that of the segment, and which is quite distinctly marked off from the rest of the segment, as seen in profile view, by a slight constriction as its base.

Superior appendages not quite as long as 10, quite complicated, blackish; in dorsal view diverging from each other, each bifid at tip, with outer and inner branches, the latter reaching farther caudad. In profile view three divisions of the distal part of the appendage are visible, two outer and one inner between the other two; of the two outer, one is above the other, being the outer branch of the dorsal view, and is separated from the lower outer branch by a regular concave curve, within which the inner branch of the dorsal view appears. From the ventral surface of the inner branch projects downward a

strong acute spine, which is curved anteriorly (cephalad) at its tip ; this spine is concealed by the inferior appendage of the same side of the body, lying laterad to it in an ordinary profile view. Inferior appendages shorter than the superiors, higher than long in profile view, upper edge produced backward (caudad) and slightly upward to an acute apex, which reaches beyond the level of the rounded postero-inferior angle of the appendage, distal edge concave.

Legs obscure brown, femora darker, 7-8 spines on the outer row of the third tibia.

Wings uncolored, stigma dark brown, surmounting one cell, its costal edge very little longer than the proximal or distal edges ; three antenodal ultraquadrilateral cells on all wings, anal vein (= inferior sector of the triangle of de Selys) parting from the hind margin proximal to the cubito-anal (= basal postcostal of de Selys) cross-vein on the front wings by a distance almost as great as the length of the cross-vein itself, on the hind wings by a distance distinctly less than the length of the cross-vein. Front wings with 12-13 postnodals ;  $M_2$  (= nodal sector of de Selys) arising at the fifth. Hind wings with 10-11 postnodals ;  $M_2$  arising at the fourth.

Abdomen 30, hind wing 20.5 mm.

♀ unknown to me.

*Habitat* : — COLOMBIA, Santa Fe de Bogota, by Lindig, 1863, 1♂. Museum of Comparative Zoölogy, Cambridge, Mass.

The specific name is a manuscript name of Hagen's, under which this specimen and a number of others have stood for many years. These other specimens, male and female, are, with one exception, very immature, and the males have lost the hind end of the abdomens. A mature female differs in the shape of the pterostigma and in a number of details of the venation. Taking these defects and differences into consideration, I am very doubtful whether these other specimens also belong to *ovigerum*.

#### Genus ACANTHAGRION.

The following synopsis will assist in the identification of the species of the typical group of this genus, the group of *gracile* Rambur, which agree in having the anal vein (= inferior sector of the triangle of de Selys) parting from the hind margin of the wing at, or distal to (*not* proximal to) the cubito-anal cross-vein (= basal postcostal of de Selys) on all the wings.

MALES.

I. *Superior appendages as long as, or longer than, the inferiors.*

- A. Superior appendages directed downward (ventrad) as well as caudad, not curved up at tip, and projecting only a slight distance beyond the level of the superiors.
- B. Pale postocular spots not confluent with the pale color of the rear of the head.
- C. Costal side of stigma of front and hind wings longer than the proximal or distal sides.
- D. Dorsum of abdominal segment 2 blue, with a black lance-head spot pointed anteriorly, but not reaching the anterior end of the segment.  
*gracile lancea.*
- DD. Dorsum of abd. seg. 2 black for its entire length.
- E. Inferior appendages but slightly, if at all, upcurved at the tip.
- F. Abdominal segment 10 not more than one-and-one-fourth ( $1\frac{1}{4}$ ) times as high in profile view as segment 9 at base.
- G. Superior appendages not widened at apex.
- H. Dorsum of abd. seg. 7 black, but its hind end blue.  
*gracile.*
- HH. Dorsum of abd. seg. 7 black, including its hind end.
- J. Black humeral stripe wider than, or as wide as, the pale blue antehumeral.  
*gracile minarum.*
- JJ. Black humeral stripe represented only by small black marks at upper and lower ends of humeral suture, the antehumeral blue therefore widely confluent with the blue of the side of the thorax.  
*gracile ablutum.*
- GG. Superior appendages widened at apex.  
*latopistylum*<sup>18</sup>
- FF. Abd. seg. 10 one-and-one-third to one-and-one-half ( $1\frac{1}{3}$ - $1\frac{1}{2}$ ) times as high in profile view as segment 9 at base; apex of dorsal process of 10, as seen in end view, not half as wide as the maximum width of 10 itself, very slightly bifid; pale colors of upper surface of head and of thorax pale blue, abd. seg. 7 blue at hind end.  
*gracile ascendens.*
- FFF. Abd. seg. 10 twice as high in profile view as seg. 9 at base; apex of dorsal process of 10, as seen in end view, almost as wide as the maximum width of 10 itself, deeply bifid, branches diverging, each branch subacute at tip; pale colors of upper surface of head and of thorax orange-red, abd. seg. 7 black throughout.  
*apicale.*
- EE. Inferior appendages strongly upcurved at tips, abd. seg. 7 black. *cuyabæ* and subspecies (for their differences see *postea*).

<sup>18</sup> Calvert, Anales Mus. Nac. Buen. Ayres, vii, p. 26, figs. 1-3. 1899. Paraguay.

- CC. Costal side of stigma on the hind, and often also on the front, wing shorter than the proximal or distal side, inferior appendages strongly upcurved at tips, dorsum of 2 and of 7 black. *truncatum.*
- BB. Pale postocular spots confluent with the pale color of the rear of the head; superior appendages with an anteterminal constriction in profile view, inferior appendages but slightly, if at all, upcurved at tips, dorsum of 7 black. *temporale.*
- AA. Superior appendages directed caudad, but not ventrad, curved up in the distal half, projecting caudad twice as far as do the inferior appendages.
- K. Each postocular spot one-third as wide as the distance from eye to eye, and touching the eye-margin, second lateral thoracic suture with a short black mark at its upper end only, dorsum of 2 chiefly blue with a triangular black spot on its middle, dorsal black of 3-5 pointed anteriorly, 10 blue dorsally. *chararum.*
- KK. Each postocular spot one-fourth to one-fifth as wide as the distance from eye to eye and not touching the eye-margin, second lateral thoracic suture with a black stripe reaching from the upper end two-thirds of the way down to the metastigma, dorsum of 2 chiefly black with only a narrow transverse basal blue ring, dorsal black of 3-5 almost rounded anteriorly, 10 black dorsally. *chacoense.*
2. Superior appendages distinctly shorter than the inferiors.
- L. Nasus and dorsum of prothorax black, a black humeral stripe (interrupted or not interrupted superiorly), an interrupted black stripe on the second lateral thoracic suture, abd. segs. 2 and 3 chiefly black, 2 with a posterior terminal transverse pale band, 3 with a narrow basal pale ring, 8 and 9 blue with a lateral longitudinal black stripe on each side. (From de Selys' description.) *trimaculatum.*
- Nasus and prothorax entirely blue, a very short black line on the upper ends only of the humeral and second lateral thoracic sutures, abd. segs. 2 and 3 chiefly blue, 2 with an isolated transverse black stripe at three-fourths' length, 3 with hindmost sixth black, 8 and 9 blue without black markings. *chirihuanum.*

## FEMALES.

- A. Postocular spots not confluent with the pale color of the rear of the head.
- B. Black humeral stripe complete.
- C. Abdominal segments 9 and 10 (and in some also the hind end of 8) blue, 9 with a basal black spot on each side. Size larger, abd. 23-27, hind wing 17-18 mm. *gracile, latapistylum.*
- CC. Abdominal segments 9 and 10 black dorsally.
- D. Size larger (abd. 23, hind wing 16 mm.). *gracile minarum.*
- DD. Size smaller (abd. 19-20, hind wing 13-15 mm.). *truncatum.*
- BB. Black humeral stripe represented only by a short black line on the upper end of the humeral suture and a brown spot at its lower end, 8-10 as in *gracile.* *gracile ablutum.*
- AA. Postocular spots confluent with the pale color of the rear of the head, abd. segs. 9 and 10 blue, 9 with a triangular basal black spot on each side, abd. 20-21, hind wing 14-15 mm. *temporale*
- (The females of the other species are unknown.)

70. *Acanthagrion gracile* Rambur.

*Acanthagrion gracile* Calvert, Biol. Centr.-Amer. Neurop. pp. 115, 382, pl. v, fig. 20. 1902, 1907.

VENEZUELA, Caracas, by R. M. Bartleman, 1 ♀. U. S. National Museum.

*Habitat*: — BRAZIL, Bom Fim, State of Bahia, at a small pond in city, November 2, 1907, 2 ♂, and at Fazenda de Amaratu, Nov. 21, 1907, 1 ♂, 1 ♀, by J. D. Haseman; Rio de Janeiro, November, 3 ♂ and parts of 2 others, and Desterro, part of 1 ♂, by H. H. Smith. Carnegie Museum, Pittsburgh.

São Sebastião, November 1, 1900, by A. Hempel, 1 ♂ 1 ♀. Academy, of Natural Sciences, Philadelphia.

PARAGUAY, Sapucay, January 27, 1903, by W. T. Foster, 1 ♀ with males of *gracile minarum*. U. S. National Museum.

ARGENTINA, Sta. Helena, east side Rio Paraná, December 21, 1 spmn., by H. H. Smith. Carnegie Museum, Pittsburgh.

71. *Acanthagrion gracile minarum*.

*Acanthagrion gracile* race? *minarum*, Selys, Bull. Acad. Belg. (2) xli, p. 309. 1876.

In the *Biologia Centrali-Americana*, Neuropt., p. 382, record is made of specimens from Central America having abdominal segment 7 black at the hind end, consequently resembling *gracile minarum*. Comparing what on inspection seemed to be average specimens with 7 so colored, I obtained the following measurements in millimeters:

	Surubres, Costa Rica.	Gualan, Guat- emala.	Chapada, Matto Grosso.
(1) Width of head.	3.16	3.36	2.48
(2) Width of one pale postocular spot, measured at right angles to longi- tudinal axis of body.	.6	.5	.36
Ratio of (2) to (1).	.19	.148	.145
(3) Maximum height of abdominal segment 10 in profile view.	1.28	1.2	.88
(4) Height of abdominal segment 9 at anterior end.	.76	.88	.72
Ratio of (3) to (4).	1.68	1.36	1.22

For further comparison with the data given in the *Biologia*, l. c., for the examples from Gualan and Surubres, fifteen males of *gracile minarum* from Chapada, abdomen 21.5–24.5, hind wing 13.5–15 mm., give the following numbers of postnodals: on the front wings,

9 (26.7 per cent.), 10 (70 per cent.), 11 (3.3 per cent.); on the hind wing 7 (6.7 per cent.), 8 (73.3 per cent.), 9 (20 per cent.). On the hind wings of these fifteen males,  $M_2$  arises at the fourth postnodal in every case,  $M_{1a}$  (= ultranodal of de Selys) at the sixth (6.7 per cent.), seventh (86.7 per cent.) or eighth (6.7 per cent.) postnodal.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 15 ♂ and parts of 25 ♀ others, 1 ♀ and parts of 3 ♀ others, some numbered 29, 35, 44, 49, 79, 120, 148, 379 by the collector. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, by W. T. Foster, January 16, 17, and 27, 1903, 4 ♂, numbered 16 by the collector. United States National Museum. The single female from Sapucay is *gracile* type.

72. **Acanthagrion gracile ablutum**, subsp. nov.

(PLATE V, FIG. 80.)

♂. Head dark brown or black above, each large blue postocular spot dotted here and there with black; nasus, a mid-basal labral point, antennæ, and in some even the lower part of the frons and the rhinarium black, remainder of the face blue, underside and rear of head very pale blue, or cream-color.

Prothorax black, its sides inferiorly, a lateral spot and a pair of median dots on the middle lobe blue. Hind margin of hind lobe convex, not remarkably produced.

Remainder of thorax blue, the following black: a mid-dorsal band .88 mm. wide at mid-height, an elongated spot at the upper end of the humeral and of the second lateral suture, a line on the upper end and a round dot (often brown) at about mid-length of the obsolete first lateral suture; a large angular brown spot occupies the lower end of the mesepimeron and the mesinfraepisternum.

Abdomen black, the following blue: the sides and under surfaces of 1–10, except where encroached upon by the dorsal black at the hind ends of 3–7; a transverse anteapical band on 1 (and in some also on 2); a narrow transverse basal ring on 3–7, confluent, at least in younger specimens, with the blue of the sides; nearly all of 8 and 9, except for an inferior longitudinal black stripe on each side of each segment. Segment 10 and the appendages as in *gracile* type.

Legs black, inferior surfaces of femora and of tibiæ pale (bluish?).

Wings clear; stigma rhomboidal, blackish, its costal edge longest; fore wings with 12–14 postnodals, 12 most frequent; hind wings with 10–12 postnodals, 11 most frequent;  $M_2$  arising nearest the fifth.



♀. Differs from the male as follows: upper surface of head olive, nasus bluish, with a short black line on each side, antennæ olive or blue, black of prothorax and mid-dorsal mesothoracic stripe replaced by pale brown, hind prothoracic lobe pale brown with a median longitudinal black line, line on the upper end of the obsolete first lateral thoracic suture and round dot on the same suture pale brown, abdominal segment 8 black, its hindmost dorsal third blue, 9 blue, with a broad lateral black spot on each side, occupying the anterior half of the segment, 10 blue, a black stripe on each side and a black line along its posterior dorsal margin, the margin narrowly cleft medially to about half the length of the segment. Appendages a little shorter than 10, conical, black; anal tubercle and genital valves blue, "palps" of the latter black.

Legs chiefly pale (blue?), a black stripe widening distally on the antero-superior face of each femur, and a narrower black line on the same face of each tibia, tarsal articulations black.

Front wings with 13-14 postnodals, hind with 11-12.

*Dimensions*: Abdomen ♂ 25-29, ♀ 24.5-?; hind wing, ♂ 17.5-19, ♀ 18.5-20; width of head, ♂ 3.4, ♀ 3.4; width of one postocular spot, ♂ .64, ♀ .68; maximum height of segment 10, ♂ 1.1; height of segment 9 at base, ♂ .84; width of tip of dorsal process of 10, ♂ .34; maximum width of 10, ♂ .8 mm. The last six of the dimensions are based on only one individual of each sex.

*Habitat*: — BOLIVIA, near Coroico, Yungas, May 2 and 10, June 7, 1899, 5 ♂, and Chulumani, November 29 and December 17, 1898, 2 ♀, all by W. J. Gerhard. Academy of Natural Sciences of Philadelphia.

The subspecific name proposed alludes to the absence in large part of the usual black humeral stripe of *A. gracile*, by which absence this subspecies may be readily recognized.

### 73. *Acanthagrion gracile ascendens* n. subsp.

(PLATE V, FIGS. 81, 81a.)

♂. Agreeing closely with typical *gracile* and in its chief features resembling specimens from Surubres mentioned under *gracile minarum*. It differs from all the forms of *gracile* known to me in its narrow dorsal process on abdominal segment 10 combined with the great height of that segment, the process being only one-third as wide as the segment, barely notched at tip, while in *gracile* type and varieties

and in *gracile minarum* the process is half as wide as the segment. The following measurements in millimeters may be compared with those given under the preceding subspecies :

	<i>gracile</i> type Rio Janeiro.	<i>gracile ascendens</i> Cachoeira.
(1) Width of head.	3.24	2.92
(2) Width of one postocular spot, etc.	.52	.52
Ratio of (2) to (1).	.16	.178
(3) Maximum height of 10.	1.04	1.12
(4) Height of 9 at base.	.8	.6
Ratio of (3) to (4).	1.3	1.87
(5) Width of tip of process on 10, end view.	.4	.24
(6) width of 10, end view.	.72	.72
Ratio of (5) to (6).	.55	.33

The colors of *gracile ascendens* are as in *gracile* type, the hindmost sixth of abdominal segment 10 being blue. Front wings with 9 postnodals, hind wings with 8 ;  $M_2$  and  $M_{1a}$  arising on the hind pair at the fourth and seventh postnodals respectively. Abdomen 27, hind wing 16 mm.

*Habitat* : — BRAZIL, Cachoeira, by H. H. Smith, 1 ♂ numbered 46. Carnegie Museum, Pittsburgh.

#### 74. *Acanthagrion apicale* Selys.

(PLATE V, FIGS. 82, 82a.)

*Habitat* : — PERU, Iquitos, Staudinger, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

#### 75. *Acanthagrion cuyabæ* sp. nov.

(PLATE V, FIGS. 85, 86.)

♂. Upper surface of the head black, with the usual pale (green) postocular spots ; face up to the level of the second antennal joint and including the first joint (and in some also the anterior surface of the second joint) pale green ; a short line on each side of the nasus, in some a mid-nasal point and a line on the fronto-nasal suture, and a mid-basal labral point, black ; rear and under surfaces of the head pale.

Prothorax black ; a mid-dorsal spot on its front lobe, a lateral spot and often a pair of median dots or lines on the middle lobe, and the sides inferiorly pale green ; hind margin of hind lobe convex, not remarkably produced.

Dorsum of remainder of thorax black ; a pale green antehumeral

stripe, which widens inferiorly, and at mid-height is one-third to one-half as wide as the black mid-dorsal band and one-half to three-fourths as wide as the black humeral stripe; sides of the thorax pale green, a short black line at the upper end of the second lateral suture.

Dorsum of abdominal segments 1-7 and 10 black, which black is narrowly constricted at the hind end of 1 and the base of 3, or in some interrupted near the hind end of 1, thus forming a transverse green ring, widened angularly before the hind end of 2 and subsequently contracted to its former width, widened also at the hind ends of 3-7. Sides of 1-7 pale green, or posteriorly pale blue, confluent with a narrow green ring at the articulation of 1 and 2 and at the base of 4-7; the dorsal black of 2 extends broadly forward to the green ring above mentioned and is not at all pointed anteriorly, as is the case on 3; 8 and 9 and the sides of 10 blue. Hind margin of 10 but very slightly elevated into a process, which has the general form of that of *A. gracile* and is truncated at the tip.

Superior appendages shorter than 10, of the general form of those of *A. gracile*, but shorter, directed ventrad as well as caudad; in profile view, contracted near the middle of their length, thicker at both base and apex, which latter is rounded; in dorsal view each appendage has an inner (mesal) process at the base, which, as in *gracile*, is in contact with the process of its fellow of the opposite side.

Inferior appendages shorter than the superiors and than those of *gracile*; each curved strongly upward in its distal half as well as towards the median line.

Legs pale green, femora with a superior black band, tibiae with a superior and an inferior black line less marked on those of the third legs, tarsal articulations black.

Wings clear, stigma rhomboidal, blackish, its costal edge longest. Front wings with 8-9 postnodals, 9 most frequent; hind wings with 7-8 postnodals, 7 most frequent,  $M_2$  arising nearest the fourth.

*Dimensions*: Abdomen 23-25; hind wing 14-16; width of head 3; width of one postocular spot .56; maximum height of segment 10 .76; height of segment 9 at base .68; width of tip of dorsal process of 10 .32; maximum width of 10 .74 mm.

♀. Unknown.

*Habitat*:—BRAZIL, Cuyabá, 4 ♂ and parts of three others; Uacaryzal, 1 ♂; Cachoeira Cuyabá, flooded campos, January 26, 2 ♂ and parts of 7 others, some numbered 12, 24 or 25 by the collector; all by H. H. Smith. Carnegie Museum, Pittsburgh.

76. *Acanthagrion cuyabæ fimense* subsp. nov.

(PLATE V, FIG. 84.)

♂. A single male from the State of Bahia is perhaps entitled to subspecific rank. It differs from *cuyabæ* type as follows:

Superior abdominal appendages thicker, heavier, especially as seen in profile view; pale colors blue throughout instead of green; mid-dorsal thoracic carina reddish; dorsal black on abdominal segment 2 narrowing anteriorly on the first third of the segment, but not pointed. Abdomen 24, hind wing 17 mm.

*Habitat*: — BRAZIL, Bom Fim, State of Bahia, Fazenda de Amaratu, November 20, 1907, by J. D. Haseman, 1 ♂. Carnegie Museum, Pittsburgh.

77. *Acanthagrion cuyabæ freirensis*, subsp. nov.

(PLATE V, FIG. 83.)

♂. Differs from *cuyabæ* type in having the superior appendages longer, distal portion not thicker than the middle, but tapering slightly to the rounded apex, dorsal black on abdominal segment 1 not constricted posteriorly, black of 2 forming a lance-head spot narrowing anteriorly, but not pointed, and reaching the anterior end of the segment by a band the width of which is .2 mm. 10 postnodals on the front wings; 8 or 9 on the hind. Abdomen 27, hind wing 17.5 mm.; maximum height of abd. seg. 10 1.0; height of seg. 9 at base .92 mm.

*Habitat*: — BRAZIL, Muniz Freire in the State of Espiritu Santo, June 18, 1908, by J. D. Haseman, 1 ♂. Carnegie Museum, Pittsburgh.

This male approaches *A. gracile lancea* Selys, but differs, so far as I can judge from the descriptions of de Selys and Ris<sup>19</sup> and the latter's figure of the appendages, in having the inferior appendages more strongly curved upward, the superiors not reaching so high up on the hind surface of the tenth segment, more constricted in their distal half, (profile view), the tenth segment less elevated proportionally, and the black on the dorsum of the second abdominal segment more extended than de Selys describes for *gracile lancea*, viz.: "une tache dorsale noire en forme de fer de lance appuyée sur le bord postérieur, où elle est un peu rétrécie et formant une pointe antérieure s'arrêtant à la moitié du segment, ou prolongée presque jusqu'à la base sur une ligne très-fine."

<sup>19</sup> Hamburger Magalh. Sammelr., Odonaten, p. 11, 1904.

78. *Acanthagrion truncatum*.

(PLATE V, FIG. 87.)

*Acanthagrion truncatum* Selys, Bull. Acad. Belg. (2) xli, p. 311. 1876.

The following measurements, taken from a single male, are added for comparison with those given for allied species: width of head 2.72; width of one pale postocular spot .24; maximum height of abdominal segment 10 .72; height of abdominal segment 9 at base .72; width of tip of dorsal process of 10, end view, .24; maximum width of 10, end view, .56 mm.

Twenty-five males and three females give the following data on the origin of  $M_2$  on the hind wings: nearest the third postnodal, 24 per cent. ♂,  $33\frac{1}{3}$  per cent. ♀; midway between 3d and 4th, 30 per cent. ♂,  $33\frac{1}{3}$  per cent. ♀; nearest 4th, 44 per cent. ♂,  $16\frac{2}{3}$  per cent. ♀ (1 hind wing ♀ broken).

*Habitat*: — BRAZIL, Chapada in May, by H. H. Smith, 12 ♂ and and parts of 18 others, 1 ♀ and parts of 2 others; collector's numbers 77, 77a, 78, 79, 119, 146. Carnegie Museum, Pittsburgh.

Sete Lagoas, Minas Geraes, May, 1908, by J. D. Haseman, 1 ♂. Carnegie Museum.

São Paulo, September 14, 1900, by A. Hempel, 3 ♂, No. 304. Academy of Natural Sciences of Philadelphia.

79. *Acanthagrion temporale*.

(PLATE V, FIG. 92.)

*Acanthagrion temporale* Selys, Bull. Acad. Belg. (2) xli, p. 312. 1876.

♂. De Selys' description was based on a pair, the male of which was imperfect. To fill up the gaps thus caused in his account, the following notes are added:

Abdominal segments 8 and 9 and the sides of 10 blue, dorsum of 10 black, its hind margin with the usual median semicircular excision, the edges of which are elevated into a process having a truncated tip when viewed from behind.

Superior appendages directed strongly downward (ventrad) as well as caudad, about equal in length to 10, when allowance is made for their declined position; in profile view slightly constricted at two-thirds' length, again enlarged at the apex which is rounded and slightly notched.

Inferior appendages projecting caudad to the same level as do the superiors, curved slightly upward and slightly inward at apex.

Front wings with 8-9 postnodals, hind with 7; 90 per cent. of the hind wings of 15 ♂ have  $M_2$  arising nearest the fourth postnodal.

*Dimensions*: Abdomen 19.5-20; hind wing 12.5-13; width of head 2.76; width of one postocular spot .32; height of abdominal segment 10 .8; height of segment 9 at base .76; width of dorsal process of 10, end view, .22; maximum width of 10, end view, .64 mm. The last six measurements taken from one individual only.

♀. Nasus black, its free margin narrowly pale. In the Cachoeira example the black dorsal marks on 9 reach the whole length of the segment. Two females have  $M_2$  on the hind wings arising nearest the fourth postnodal; in the third female it arises nearest the third. Abdomen 20-21.5, hind wing 14-15 mm.

*Habitat*: — BRAZIL, Cachoeira Cuyabá, flooded campo, January 26, 2 ♂, 1 ♀, No. 15, and Chapada, 6 ♂ and parts of 10 others, and of 1 ♀, nos. 77, 147, 147a, all by H. H. Smith. Carnegie Museum, Pittsburgh.

Barreiras, State of Bahia, January 3, 1908, 1 imperfect ♂; and Sete Lagoas, Minas Geraes, May 4, 1908, 1 ♀, both by J. D. Haseman. Carnegie Museum.

## 80. *Acanthagrion chararum*, sp. nov.

(PLATE V, FIGS. 88, 89.)

♂. Vertex dark blackish-brown, this color reaching down between the antennæ to the nasus, which may be of the same color narrowly bordered with blue on its free margin, or blue with a dark streak on each side. Blue postocular spots very large, separated only incompletely from the pale (cream?) color of the rear of the head by a narrow brownish stripe. Rhinarium, labrum, genæ, and external surfaces of mandibles pale blue; a black mid-basal labral point; labium pale (blue or cream-color?).

Prothorax blackish-brown, front lobe, a lateral spot and a pair of median lines on the middle lobe, middle of the hind lobe and the sides inferiorly blue; hind margin of hind lobe convex, low.

Dorsum of meso-metathorax dark reddish-brown; a blue antehumeral stripe widening somewhat inferiorly, at mid-height one-fourth to three-fifths as wide as the dark mid-dorsal, and one-half, or more, as wide as the dark humeral stripe; the dark mid-dorsal stripe is much contracted at its extreme anterior (lower) end; the dark humeral stripe is contracted both at the upper and near the lower end of

the humeral suture and at the latter its outer edge bends outward (laterad) and backward (caudad) almost at right angles, then again downward (ventrad) and forward (cephalad) on the lower part of the mesepimeron, continuing downward over the mesinfraepisternum. These dark stripes (humeral and mid-dorsal) show a tendency to become black along the middle line of each stripe leaving the edges and extremities brown, and eventually probably become black throughout. Sides of the thorax blue; a short very fine brown or black line on the upper end of the obsolete first lateral suture, a longer thicker black line on the upper end of the second suture, in some continued downward by a very fine line; pectus blue.

Abdominal segments 1 and 2 blue; the intersegmental articulations of 1 and 2 and of 2 and 3, a square dorsal basal spot on 1, and an isolated triangular dorsal spot with its anterior angle more or less truncated on the middle of 2, black. Dorsum of 3-7 black, having a lanceolate form on 3 and 4, narrower and more acutely pointed anteriorly on 3, and markedly contracted at three-fourths or four-fifths of the length of the segment, again widening to the hind end; sides and a transverse basal ring on 3-7 blue, blue decreasing in extent on each successive segment. Segments 8-10 blue, hind margin of 10 very slightly excised and elevated into a low process, the tip of which in rear view is rather rounded than truncated.

Superior appendages a little longer than 10, in dorsal view nearly straight, somewhat divergent, each one rather narrow, its inner edge straight, outer edge slightly convex, apex tapering, subacute; the inner basal process of each appendage corresponding to that of *A. gracile* is present, but concealed under the hind margin of 10; in profile view each appendage rapidly decreases in thickness in its basal half, its upper edge slanting caudad and ventrad, its lower edge nearly horizontal, distal half slenderer, of subuniform thickness, directed slightly upward, apex subacute. Inferior appendages about two-fifths as long as the superiors, appearing merely as small tubercles applied against the lower surfaces of the superiors. Legs blue; a superior band on the femora, much of the tarsi, and, in some at least, the tibiæ blackish inferiorly.

Wings clear, stigma rhomboidal, blackish, its costal edge more often longer than the proximal or distal edges, but not infrequently equal in length. Front wings with 10-11 postnodals, 11 more frequent; hind wings with 8-10 postnodals, 9 most frequent;  $M_2$  arising nearest the fourth.

*Dimensions* : Abdomen 26–28.5; hind wing 18–19.5; width of head 3.4; width of one postocular spot .72; maximum height of segment 10 .96; height of segment 9 at base .84; width of tip of dorsal process of 10 about .16; maximum width of 10 .8 mm. The last six dimensions taken from one specimen only.

♀ unknown.

*Habitat* : — BRAZIL, Cuyabá, 7 ♂ and parts of 1 other; Cachoeira, parts of 2? ♂ numbered 26 by the collector; all by H. H. Smith. Carnegie Museum, Pittsburgh.

The specific name is suggested by that of the nearby Charaes, Xaraes, or Jaraes marshes, taken in turn from that of a former Indian tribe.

81. ***Acanthagrion chacoense***, sp. nov.

(PLATE V, FIGS. 90, 91.)

♂. Vertex black, this color reaching down on the frons between the antennæ almost to the nasus, which is also black narrowly bordered with blue along its free margin, black of frons and of nasus connected by a vertical black line; the following blue: postocular spots, a dot on each side of the median ocellus, a larger spot behind each antenna-base, a short line between the median ocellus and each antenna, genæ, external surface of mandibles, labrum (except a mid-basal black point) and the labium, or the last possibly cream-color in life. Rear of the head partly pruinose, but apparently largely blue.

Prothorax black; sides inferiorly, a dorsal spot on the front lobe, a pair of short median lines on the middle lobe, a mid-dorsal trace on the hind lobe, blue; hind margin of hind lobe low, convex, slightly truncated, and with a minute notch medially.

Dorsum of meso-metathorax black; a blue antehumeral stripe, which is narrowest at two-thirds' height, and at mid-height is one-third as wide as the black mid-dorsal and one-half as wide as the black humeral; black mid-dorsal much contracted at its anterior (lower) end; black humeral stripe uniting at its upper end with a short black line on the upper end of the obsolete first lateral suture, at its lower end its outer edge bends twice similarly to the condition described for *A. chararum*. Sides blue, a black stripe on the second lateral suture from the upper end to more than half-way to the level of the metastigma below, which latter is a blackish spot. Pectus pale blue, a blackish area, covered with pruinose, at the hind end.

Dorsum of abdominal segment 1 black, (in the Corumba ♂ a narrow



transverse apical blue ring), sides blue; dorsum of 2 black, sides, a narrow transverse basal ring (mid-dorsally interrupted by a fine black line) and a very fine transverse apical ring, blue; dorsum of 3-7 black, this color narrowed at four-fifths of each segment's length and widened greatly in the hindmost fifth; sides and a transverse basal ring on these segments blue; 8 and 9 blue; 10 black, except ventrally, otherwise as in *A. chararum*.

Superior appendages very similar to those of *A. chararum*, but in profile view a little thicker at the base, decreasing in thickness more rapidly in the proximal half. Inferiors as in *A. chararum*.

Legs pale blue; femora with a superior stripe, tibiae with an anterior line, black.

Wings uncolored, stigma rhomboidal, blackish, its costal edge equal to, or slightly longer, or slightly shorter, than the proximal or distal edges. Front wings with 10-12 postnodals, hind wings with 8-9;  $M_2$  on the latter arising nearest the fourth postnodal, or between the fourth and fifth.

*Dimensions*: Abdomen 25-26; hind wing 17; width of head 3.32; width of one postocular spot .52; maximum height of segment 10 .92; height of segment 9 at base .76; width of tip of process of 10, end view, about .16; maximum width of 10 .84 mm.

♀ unknown.

*Habitat*: — BOLIVIA, Piedra Blanca, April, 1 ♂.

BRAZIL, Corumba, May, part of 1 ♂. Both specimens by H. H. Smith, Carnegie Museum, Pittsburgh.

## 82. *Acanthagrion chirihuanum*, sp. nov.

(PLATE V, FIGS. 93, 94.)

♂. Upper surface of the head olive, passing gradually into greenish-blue on clypeus and labrum; each large blue postocular spot is bounded anteriorly and posteriorly by an ill-defined blackish line, these lines being the only black markings on the head. Rear of the head blue, labium cream-colored.

Prothorax blue, hind margin low, slightly trilobed, median lobe a little more convex than the lateral lobes.

Meso-metathorax blue; a mid-dorsal black band narrowing from .36 mm. at its upper (posterior) end to .24 mm. at its lower (anterior) end. In the imperfect male this band is similarly proportioned, but narrower. A short black mark near the upper end of the humeral suture

continued downward by a very fine brown line ; a brown point near the lower end of the mesepimeron ; a small black spot at nearly mid-length of the obsolete first lateral suture ; a short black mark at the upper end of the second lateral suture.

Abdominal segments 1-3 chiefly blue, with the following black : a square dorsal basal spot on 1, the intersegmental articulations between 1 and 2 and 2 and 3, a short isolated transverse band on the dorsum of 2 at two-thirds' length, and the hindmost sixth of 3. Dorsum of 4-7 dark brown, becoming black at the hind end of each segment, a narrow transverse basal ring on each and the sides inferiorly blue ; 8-10 blue, hind margin of 10 with a median dorsal, almost semicircular, excision, reaching more than half-way toward the anterior margin of the segment, edges of the excision only slightly elevated, presenting the appearance in end view of a low truncated process slightly bilobed.

Superior appendages in dorsal view wider than long, shorter than 10, bifid at apex, branches of equal length, outer branch with a more acute tip, inner branch applied against the inner branch of its fellow of the opposite side, the surface thus in contact black, while the rest of the appendage is pale blue ; in end view the inner branch is much higher than the outer, and is easily recognized by its black contact-surface just mentioned ; in profile view each superior appendage is directed slightly upward ; upper and lower edges straight and slightly divergent, the apparent apex being formed by the moderately convex black posterior margin of the inner branch, on which is silhouetted the acute pale blue tip of the outer branch. Inferior appendages projecting caudad about twice as far as do the superiors, thick at the base, tapering to the subacute tip, which is directed upward and but slightly toward its fellow of the opposite side.

Legs pale blue, femora with a superior blackish band.

Wings clear, stigma rhomboidal, blackish, its costal edge longest ; front wings with 10-11 postnodals ; hind wings with 9 postnodals ;  $M_2$  arising nearest the fourth or (one wing) fifth.

*Dimensions* : Abdomen 25.5 ; hind wing 15.5-16 ; width of head 3.68 ; width of one blue postocular spot .64 ; maximum height of 10 .92 ; height of 9 at base .96 ; width of tip of dorsal process of 10 .36 ; maximum width of 10 .64 mm.

♀ unknown.

*Habitat* : — BRAZIL, Cuyabá, by H. H. Smith, 1 ♂ and part of one other. Carnegie Museum, Pittsburgh.

The specific name proposed is derived from that of an Indian tribe of the neighborhood.

### 83. *Acanthagrion interruptum* Selys.

*Acanthagrion interruptum* Ris, Hamburg. Magal. Sammelr. Odon., p. 10, fig. 4. 1904.

*Habitat*: — CHILE, Baños de Cauquenes, 1 ♀. U. S. National Museum.

Talca, 2 ♂ 1 ♀, Lota 1 ♂ 1 ♀, Penco, 48 ♂ 16 ♀, Concepcion, 8 ♂, 8 ♀, all in January, 1905. Academy of Natural Sciences, Philadelphia.

All the above specimens were collected by Señor Carlos E. Reed.

### 84. *Acanthagrion cheliferum*.

(PLATE V, FIG. 98.)

*Acanthagrion ? cheliferum* Selys, Bull. Acad. Belg. (2) xli, p. 319. 1876.

*Acanthagrion cheliferum* Ris, Hamburg. Magal. Sammelr., Odon., p. 12, fig. 7 (apps. ♂). 1904.

Six males and six females give the following data for the hind wings: costal edge of stigma longer (100 per cent. ♂,  $83\frac{1}{3}$  per cent. ♀) or shorter ( $16\frac{2}{3}$  per cent. ♀) than proximal or distal edges;  $M_2$  arising nearest the fourth (75 per cent. ♂, 100 per cent. ♀), third ( $16\frac{2}{3}$  per cent. ♂), or midway between the third and fourth ( $8\frac{1}{3}$  per cent. ♂) postnodal.

As noted by Dr. Ris for his material from Bahia, so in the present specimens from that locality, the nasus is pale blue, except for a black line on the fronto-nasal suture. There is no perpendicular median black line on the frons connecting the black of the upper part of the frons with that of the nasus; the blue postocular spots are larger as well as the blue lateral spots on the middle lobe of the prothorax; this lobe has also a pair of median blue lines, the antehumeral blue stripe is wider and abdominal segment 8 is entirely blue. Hagen had attached the manuscript name of *rusticum* to these Bahia examples, and this name may be employed subspecifically, if desired. The abdomen ♂ is 25 mm., hind wing ♂ 15.5–17 mm.

The remainder of the material has the usual characters of *cheliferum* type, with abdominal segment 8 black or dark bronze-green dorsally in both sexes, except in one male from Rio Grande do Sul, in which the hindmost third of the dorsum of 8 is blue, confluent with that of the sides. The females of form *a* of Ris have a pair of basal dorsal

black spots on 9. Abdomen ♂ 20.5-23, ♀ 20.5-22; hind wing ♂ 13-14.5, ♀ 14-15.5 mm.

*Habitat*: — BRAZIL, São Paulo, September 14, 1900, by A. Hempel, 3 pairs (the ♀♀ form *b* of Ris), no. 303; and Rio Grande do Sul, by H. v. Ihering, 2 ♂, 2 ♀ (form *a* of Ris), no. 330. Academy of Natural Sciences of Philadelphia.

ARGENTINA, Santa Helena, December 21, by H. H. Smith, 1 ♀ (form *a* of Ris). Carnegie Museum, Pittsburgh.

Subspecies? *rusticum*: BRAZIL, Bahia, 1 ♂ and parts of 1 other? and of 1 ♀. Museum of Comparative Zoölogy, Cambridge, Mass.

Judging from the scanty material before me the females of *cheliferum* (and *rusticum*) differ from those of *ambiguum* by the wider head, 3.1-3.2 mm., as compared with 2.8 mm., and the lower, less deeply bilobed, hind prothoracic margin.

### 85. *Acanthagrion ambiguum*.

(PLATE V, FIG. 97.)

*Acanthagrion ambiguum*, Ris, Hamburg. Magal. Sammlr., Odon., p. 13, fig. 8 (apps. ♂). 1904.

In the present material: the costal edge of the pterostigma varies from longer than, equal to, to shorter than the proximal or distal edges;  $M_2$  on the hind wings arises nearest the fourth postnodal in one male and the female, nearest the third on the right side and midway between third and fourth on the left side of the other male. The female seems to be form *b* of Ris, or perhaps is intermediate between *b* and *c*; its colors are somewhat faded, its prothorax is reddish, with a transverse black line between the middle and hind lobes; hind margin a little higher than in the ♂, rather deeply bilobed.

Abdomen ♂ 19, ♀ 20; hind wing ♂ 12, ♀ 14 mm.

Front wings with 8-9 postnodals, hind wings 6-7.

*Habitat*: — PARAGUAY, Villeta, by H. H. Smith, 2 ♂, 1 ♀. Carnegie Museum, Pittsburgh.

### 86. *Skiallagma simulacrum*, sp. nov.

(PLATE V, FIGS. 95, 96.)

♂. Vertex obscure olive, areas corresponding to the pale postocular spots of allied genera blackish, or dark metallic-green; a reddish line between each lateral ocellus and the base of the antenna of the same side; face up to, and including, the second antennal joint pale greenish-blue; rear of the head pale blue; labium cream-colored.

Prothorax blue, middle of hind lobe and in some also of middle lobe blackish, hind margin flatly convex.

Meso-metathorax blue, a mid-dorsal band, .32-.52 mm. wide at mid-height, very slightly narrower below (anteriorly), dark metallic-green, margined with a black line on each side, or entirely black; a black line on the entire length of the humeral suture, a little widened at its upper end; a very fine short black line on the upper end, and a black spot near mid-length of the obsolete first lateral suture; a black mark at the upper end of the second lateral suture; the blue ante-humeral stripe varies in width from wider to somewhat narrower than the dark mid-dorsal.

Abdominal segments 1-3 blue, the following markings black: a square basal dorsal spot on 1, occasionally connected with the hind margin of the segment by a fine black line, the articulations of 1 and 2 and of 2 and 3 very narrowly, a rounded spot on the posterior half of 2 connected with the hind end of the segment and in some with the anterior margin by a mid-dorsal black line, and the hindmost fourth of 3; in two specimens the black spot on 2 is reduced to an isolated transverse stripe. Dorsum of 4-7 dark brown, becoming blackish on the hind end of each segment, where it reaches down on the sides, which latter, together with a transverse basal ring on each segment, are blue. 8 and 9 and the sides of 10 blue. Dorsum of 10 black, its hind margin with a median concave excision, extending from one-third to one-half way toward the anterior margin of the segment, edges of excision somewhat elevated to form a dorsal process, the tip of which is truncated and somewhat bilobed in rear view, much as in some species of *Acanthagrion*.

Superior appendages in dorsal view about one-third as long as 10, much wider than long, apex as wide as, or wider than, the base, shallowly concave, inner apical angle, thus formed, slightly more acute than the outer, each appendage in contact with its fellow of the opposite side; in profile view the lower outer portion of the appendage is prolonged somewhat downward, and the more acute inner apical angle shows as a minute more dorsally placed spine.

Inferior appendages projecting caudad beyond the level of the superiors for a distance equal to about one-half of the length of the latter, tapering from the base to the apex, which is curved upward; the apex is narrower in profile than in ventral view, as in the latter the two inferiors converge and the apex of each is transversely truncated.

Legs pale blue ; femora with a superior blackish stripe.

Wings clear, stigma grayish-brown, its costal edge longest, vein A (= inferior sector of the triangle of de Selys) separating from the hind margin at (85 per cent. front wings, 70 per cent. hind) or distal to (30 per cent. hind wings) the cubito-anal cross-vein (= basal post-costal vein of de Selys); front wings with 9-10 postnodals, 9 more frequent ; hind wings with 7-9 postnodals, 8 most frequent ;  $M_2$  (= nodal sector of de Selys) arising nearest the fourth (95 per cent.). The percentages are based on 10 males.

Abdomen 23.5-24.5 ; hind wing 14-16 mm.

One male has a blackish spot on the middle of the nasus ; an ill-defined blackish spot on the lower part of the mesepimeron, confluent with the lower end of the black humeral line, and the black on abdominal segment 3 prolonged forward to within one-fifth of the length of the segment from the base as a narrow stripe very acutely pointed anteriorly. The ventral side of the thorax is pruinose, so that these additional black markings are perhaps accompaniments of age.

One other male shows traces of pale postocular spots ; possibly in this species there is an ontogenetic disappearance of these spots as in *Hesperagrion heterodoxum* (Selys) of Mexico.<sup>20</sup>

♀. Unknown.

*Habitat* : — BRAZIL, Cuyabá, 4 ♂ and parts of 8 others ; Cuyabá, lakes, January, 1886, part of 1 ♂ ; Cachoeira Cuyabá, flooded campo, January 26, part of 1 ♂, no. 13 ; all by H. H. Smith. Carnegie Museum, Pittsburgh.

*Skiallagma simulacrum* shows an extraordinary resemblance in form and color to *Acanthagrion chirihuanum*, a resemblance which has suggested the specific name here proposed. It differs from that species at once in the shape of the abdominal appendages and in the absence of pale postocular spots.

From the description of the only other known species of *Skiallagma*, *S. baueri* Förster,<sup>21</sup> *S. simulacrum* differs in the greater extent of blue on the face, prothorax, meso-thoracic dorsum, and abdominal segment 3 ; the shorter superior and the longer (relatively to the superiors, at least) inferior abdominal appendages.

<sup>20</sup> Cf. *Biologia Centrali-Americana*, Neuropt., p. 103.

<sup>21</sup> *Insekten Börse*, xxiii, p. 15, 1906. In that description, second column, 4th line, for "Thorax" read "Abdomen."

## Genus OXYAGRION.

The genera *Oxyagrion* and *Telebasis* (*Erythrargrion* Selys) are much alike, differing chiefly in the presence of a vulvar spine in the females of the former and its absence in the latter. De Selys has also suggested<sup>22</sup> that in the males of *Oxyagrion* one or more of the posterior abdominal segments are blue, while this is not the case in *Telebasis*. Of the ten species which he referred to *Oxyagrion* in 1876,<sup>23</sup> three, however (*pavidum*, *miniopsis* and *basale*), have no blue abdominal segment, so that this distinction is not very helpful.

A better character is perhaps furnished by the color-pattern of the thoracic dorsum, which in *Oxyagrion* never presents any darker marking than brown, while in *Telebasis* there is always present a dark metallic-green or black stripe or band on each mesepisternum.

87. *Oxyagrion pavidum* Selys.

*Habitat*: BRAZIL, Desterro, December, one pair ♂♀, by H. H. Smith. Carnegie Museum, Pittsburgh.

88. *Oxyagrion terminale* Selys.

*Oxyagrion terminale* Ris, Hamburg. Magal. Sammelr. Odon. p. 9, fig. 2. 1904.

*Habitat*: — BRAZIL, Rio Grande de Sul, by H. H. Smith, 1 ♂. Carnegie Museum.

PARAGUAY, Sapucay, December, 1899, by W. T. Foster, 1 ♂. U. S. N. M.

89. *Oxyagrion evanescens*, sp. nov.

(PLATE III, FIG. 51; PLATE VIII, FIG. 142.)

♂. Vertex and labrum obscure, blackish or reddish-brown; traces of a reddish spot on each side a little anterior to the area occupied by the pale postocular spot of allied genera; frons, clypeus, and antennæ red; free margin of labrum, genæ, labium, and rear of head yellow.

Prothorax and thoracic dorsum reddish-brown; hind prothoracic margin low, convex; sides and ventral surface of meso-metathoracic pale greenish-yellow; a short black mark at the upper ends of humeral and second lateral sutures.

Abdominal segments 1–8 red, 1 and 2 yellow inferiorly; a pair of anteapical dorsal blackish spots on 8; 9 pale (blue?), with a blackish

<sup>22</sup> Bull. Acad. Belg. (2) xlii, p. 956.

<sup>23</sup> *I. c.*, xli, p. 291 et seq.

or brownish spot or stripe on each side; 10 obscure, with a blue? dorsal spot and a brown lateral mark.

Hind margin of 10 excised mid-dorsally one-fourth way toward base, margins of excision elevated, forming a process the tip of which in rear view is truncated.

Superior appendages in dorsal view about two-thirds as long as 10, black, inner surface pale, narrowing from base to apex, which lies at the outer edge of the appendage, so that while the outer edges of the two appendages are subparallel, their inner edges are decidedly diverging from the supero-internal basal process of each, which approaches, but is not applied against, its fellow of the opposite side; in profile view each superior appendage is directed downward as well as caudad, and is of uniform thickness in its proximal two-thirds or half, narrowed on its upper edge in the remaining distal portion, apex rounded.

Inferior appendages in profile view reaching to the level of two-thirds or more of the superiors; basal half thick, rounded, upper margin prolonged as a slender process to form the distal half of the appendage, curved upward and inward, apex acute.

Legs pale yellow; third tibia with 7-8 spines in the anterior (outer) row.

Wings clear, veins pale brown; stigma red, very small, oblique, surmounting from one-third of a cell to slightly less than one cell, variable in its proportions, costal edge on the front wings more often longer than the proximal or distal edges, but on the hind wings longer than, equal to, or shorter than those edges. Vein A (= inferior sector of the triangle of de Selys) separating from the hind margin at, or distal to, the cubito-anal cross-vein (= basal postcostal of de Selys).  $M_2$  (= nodal sector of de Selys) arising on the hind wings nearest the fourth or third postnodal. Postnodals on the front wings 7-8 (7), on the hind 6-7 (6), the parentheses enclosing the numbers of greatest frequency.

*Dimensions*: Abdomen 20-21; hind wing 13-14.5 mm.

♀ unknown.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 3 ♂ and parts of 5 others. Carnegie Museum, Pittsburgh.

The specific name proposed has been suggested by the small size of the pterostigma.



90. *Oxyagrion divaricatum* sp. nov.

(PLATE III, FIGS. 47, 48.)

♂. Dorsal surface of head, of nasus, and of thorax pale reddish-brown, redder on thorax than on the head; lower margin of frons, genæ, labium, and under and rear surfaces of head, legs, much of the ventral surface of the thorax and sides of the abdomen inferiorly yellow; labrum (its free margin yellow) and dorsum of abdominal segments 1-6 bright red. Labrum yellow, thoracic dorsum paler, ochreous, in young individuals.

Hind margin of prothorax slightly produced into a median angle. Mesepimera and metepimera each with a rather wide dull-yellowish band, the area posterior to each band reddish-brown of the same shade as the thoracic dorsum; possibly these bands may be due to post-mortem discoloration; they are not evident in the young.

The following abdominal markings are black: a fine transverse ring on the intersegmental articulations beginning with that between 2 and 3; a dorsal spot on the hind third to sixth of 6, but in some still smaller, and then isolated from the hind end of the segment; dorsum of 7 (except at the anterior end in some), 8, and 10. 9 is blue.

Hind margin of 10 medially elevated into a process with a rather narrow and slightly bifid tip. Superior appendages, viewed from above, a little longer than 10, reddish at base, blackish at apex, diverging throughout their length, each one with its outer edge slightly convex, inner edge slightly concave, narrowing to the subacute apex; in profile view each appendage is directed upward with the terminal third of the upper edge truncated almost horizontally, thus producing a fairly acute tip at the distal end of the lower edge. The inner and ventral surfaces of each superior appendage are grooved longitudinally.

Inferior appendages in profile view higher than long, upper apical angle slightly produced upward and caudad as a slender process, which reaches to about one-fourth of the length of the superiors, inferior apical angle rounded.

Wings clear, venation brown, darkening with age; stigma red, its costal edge longest.

♀. Differs from the ♂ as follows: less red in the brown of head and of thorax; labrum and sides of thorax yellowish-brown; the following black: a small mid-dorsal spot on 1, a transverse mark at two-thirds' length of 2 and at four-fifths' length of 3, the last fifth of 4 with a mid-dorsal line or stripe running forward for more than half the length

of the segment, or merely an isolated, anteapical spot in the last fifth, posterior five-sixths of the dorsum of 5, and nearly all of the dorsum of 6-10, narrowing posteriorly on 9 and 10. Sides of 6-10 brownish yellow. Appendages ochreous, slightly shorter than 10, conical. A ventral posterior spine on 8. Genital valves not reaching to the level of the hind end of the anal tubercle (11th segment), ochreous, their palps blackish-brown. Pterostigma brownish-yellow. Hind margin of prothorax directed vertically upward, instead of sloping upward and caudad, as in the case of the ♂.

In the young ♀ the head and thorax are brownish-yellow; the pale color of abdominal segments 1-5 is yellowish instead of red; dark markings on 1-10 dark metallic-green, instead of black.

♂♀. Anal vein (= inferior sector of the triangle of de Selys) separating from the hind margin at, or distal to, the cubito-anal cross-vein (= basal postcostal of de Selys) on both front and hind wings. Front wings with 8-9 (♂) or 9-10 (♀) postnodals, 9 more frequent. Hind wings with 6-7 (♂) or 7-8 (♀) postnodals, 7 more frequent.  $M_2$  (= nodal sector of de Selys) arising nearest the fourth postnodal.

*Dimensions*: Abdomen ♂ 24-25, ♀ 25; hind wing ♂ 15.5-16.5, ♀ 17-18.5 mm.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 6 ♂ and parts of 4 others, 1 ♀ and parts of 4 others, nos. 81 and 143. Carnegie Museum, Pittsburgh.

São Paulo, September 5 and 7, 1900 by A. Hempel, 1 ♂, 1 ♀. Academy of Natural Sciences of Philadelphia.

### 91. *Oxyagrion hempeli* sp. nov.

(PLATE III, FIGS. 52, 53.)

♂. Dorsal surface of head and of nasus black, an ill-defined reddish spot on each side a little anterior to that occupied by the pale postocular spots of allied genera. Genæ, labrum, (and lower part of frons?), pale blue. Labium and rear of head pale yellowish.

Thorax reddish; hind prothoracic margin low, convex; a narrow mid-dorsal mesothoracic stripe about three times as wide as the carina on which it lies; mes- and metepimera each with a rather broad pale greenish-brown or pale olive band, possibly due to postmortem discoloration.

Abdominal segments 1-6 bright coral-red dorsally, the following black: a fine transverse ring at the intersegmental articulations begin-

ning with that between 2 and 3, a rounded dorsal spot on the last fifth of 5 and of 6, the dorsum of 7 and of 10, a superior dot (at three-fifths' length of 8 and midway on 9) and an inferior longitudinal stripe on each side of 8 and 9, which are otherwise blue. Ventral surface of the abdomen chiefly yellow.

Hind dorsal margin of 10 medially elevated and excised, the process so formed having a tip, which in rear view appears to be about one-fourth as wide as the segment and slightly bilobed.

Superior appendages in dorsal view subequal in length to 10, subparallel, widest at mid-length, apex subobtuse; in profile view they are directed caudad only slightly downward, tapering from base to the subacute apex.

Inferior appendages in profile view with the upper apical angle prolonged as a process reaching to three-fifths of the length of the superiors and directed caudad, not curved upward; in ventral view the processes of the two inferiors converge somewhat, the tip of each terminating on the inner side in a minute black hook.

Legs pale yellow

Wings clear, great veins of the anterior portions pale brown; stigma red, very oblique, costal edge equal to or shorter than the proximal edge; vein A (= inferior sector of the triangle of de Selys) separating from the hind margin at the cubito-anal cross-vein (= basal postcostal of de Selys). Front wings with 11-12 postnodals. Hind wings with 9 postnodals;  $M_2$  (= nodal sector of de Selys) arising at the fourth.

Abdomen 28, hind wing 19 mm.

♀ unknown.

*Habitat*: — BRAZIL, São Paulo, September 14, 1900, by A. Hempel, 1 ♂. Academy of Natural Sciences of Philadelphia.

## 92. *Oxyagrion rufulum* Hagen.

(PLATE III, FIGS. 49, 50.)

*Agrion rufulum* Hagen, Syn. Neur. N. Amer., p. 86. 1861.

*Oxyagrion rufulum* Selys, Bull. Acad. Belg. (2), xli, p. 302. 1876.

Both descriptions of this species are based on imperfect specimens, wherefore the following:

♂. To an example from Quillota, bearing the label "Agrion vicinum ♂ Hagen," I attached the following label in 1899, "Agrees with Hagen's type of *Ag. rufulum* which has lost last three abd. segs." I have not

since seen the type; the Quillota male differs from the more detailed of the above descriptions (de Selys') as follows: Pterostigma surmounting the whole of one cell, 11 postnodals on the front wings, 9 on the hind; thoracic dorsum uniformly dark red with no indications of bands; sides reddish-yellow without bands. Abdominal segment 7 red as in 6, 8-10 yellowish-red, only the middle of the hind dorsal margin of 10 blackish adjacent to a median excision, the curved margin of which is elevated into a dorsal process, which viewed from behind shows a truncated tip nearly half as wide as the maximum width of 10. 10 is a little more than half as long as 9 in dorsal view, the superior appendages about one-and-one-third times as long as 10, but shorter than 9. The outer margin of each appendage is convex and curved inward (mesad) at the apex; inner margin slightly widened to one-fourth of the length, thence narrowed to two-thirds' length, where a strong triangular tooth projects inward almost at right angles, and is hardly distinct on its distal side from the rounded apex of the appendage. Viewed from behind, each superior appendage shows a supero-internal basal process, ending in a black tip applied against the corresponding process of the other side almost within the tenth segment itself. In profile view each superior appendage is directed caudad and slightly downward in its basal half, slightly upward in its extremity, thicker at the immediate base, then rather abruptly slenderer, gradually thickening to three-fourths' length, from which point the lower margin is truncated caudad and upward to the subacute apex.

Inferior appendages in profile view reaching to a little more than the level of half of the superiors, tapering rapidly in the basal half; distal half forming a rather slender process, which is curved moderately upward and ends in an acute tip.

Costal edge of the pterostigma the longest on all the wings. Vein A (= inferior sector of the triangle of de Selys) separating from the hind margin of the wings at (front), or a little distal to (hind) the cubito-anal cross-vein (= basal subcostal of de Selys).  $M_2$  (= nodal sector of de Selys) arising on the hind wings at the fourth (left), or between the fourth and the fifth (right), postnodal.

8-9 spines in the anterior (outer) row of the third tibia.

Abdomen 26.5, hind wing 18 mm.

An immature male from Penco is perhaps of the same species, but the appendages are distorted, so that some doubt remains. It has the pterostigma yellow, grayish in the center, surmounting less than one

cell on all wings; superior (anterior) side of the quadrilateral of the front wings longer, two-fifths as long as the posterior side, 13 postnodals on the front wings, 10 (right)–12 (left) on the hind, colors similar to those of the *Quillota* ♂ but paler; no markings or bands on the thorax;  $M_2$  arising between the fourth and fifth postnodals on the hind wings; abdomen 26.5; hind wing 19 mm.

♀. A female from Penco agrees with the first Chilean female described by de Selys, assuming that the abdomen of the latter was reddish-yellow. Abdominal segment 7 has a mid-dorsal bronze band of equal width to that on 6, but not widened at the hind end of the segment which is attained; 8 has a similar band for the anterior two-thirds of its length; 9, 10, and the appendages yellow, unspotted, the last one-and-one-half times as long as 10. A strong ventral apical spine on 8. Genital valves yellow, not reaching to the level of the hind end of 10, their "palps" also yellow, barely attaining the level of the hind end of 11 (anal tubercle). Front wings with 11 (right)–13 (left) postnodals; hind with 11, at the fifth of which  $M_2$  arises. Abdomen 26, hind wing 19 mm.

A female from Cordova, probably younger, is intermediate in abdominal markings between de Selys' two Chilean females, having 1 and 2 unmarked, 3–6 with a very narrow mid-dorsal bronze stripe widened posteriorly on each into the "petite tête ronde," 7 and 8 have the mid-dorsal bronze stripe wider, apparently reaching the entire length of 8, dorsum of 9 obscure at its hind end; 11 postnodals on the front wings, 9 on the hind; other details as above given for the Penco female. Abdomen 26, hind wing 19.5 mm.

*Habitat*: CHILE, Quillota, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

Penco, January, 1905, by Carlos E. Reed, 1 ♂, 1 ♀. Academy of Natural Sciences of Philadelphia.

ARGENTINA, Cordova, 1 ♀. Museum of Comparative Zoölogy, Cambridge, Mass.

Judging from de Selys' description of *O. rubidum* (Rambur), that species, known by the male only, is very close to *O. rufulum*, differing only in the slightly longer abdomen and in the coloring of its last four segments. It is also possible that one or more of the females here or elsewhere referred to *O. rufulum* may properly belong to *O. rubidum*.

93. *Oxyagrion basale* Selys.

(PLATE III, FIGS. 54, 55.)

*Oxyagrion basale* Selys, Bull. Acad. Belg. (2) xli, p. 303. 1876.

♂. The considerable number of individuals, which I refer to this species, differ in the following respects from de Selys' description based on a single male from "Brésil":

Quadrilateral on the front wings with the superior (anterior) side a little longer, in others a little shorter, than the internal (proximal) side and about two-fifths to one-third as long as the inferior (posterior) side; on the hind wings the superior side is longer than the internal and half as long as the inferior. Black mid-dorsal thoracic band margined on each side in some by a yellow line. Often a superior black dot on each side of abdominal segment 8 at two-thirds' length, black on dorsum of 9 and 10 reaching to the hind end of each segment, or of 9 only, longitudinally divided by red in the anterior half only of 9. Apices of the inferior appendages acute, curved upward and inward. More or less well-defined pale green postocular spots dotted with black similar to the black dotting of the thoracic dorsum.

The younger males differ from the older ones (to which latter de Selys' description applies) as follows: labium and rear of the head pale yellowish, upper surface of the head reddish brown, as also are the areas dotted with black, on which the greenish postocular spots of older stages are present; prothorax brown, with black lines occupying the various grooves and sutures; thoracic dorsum yellowish-brown; no mid-dorsal black band, inferior humeral spot, or lateral band, but numerous blackish dots on the mesepisterna, less numerous on mesepimera and metepisterna, absent from the metepimera; a short black mark on the upper ends of the humeral and second lateral sutures; red of the abdomen less brilliant; dorsum of 1 and 2 reddish-brown, of 7-10 yellowish-brown; a superior darker brown spot on each side of 9 and of 10, a transverse dorsal blackish streak on 10; pterostigma paler brown; legs yellowish, with a superior femoral and an anterior tibial blackish stripe, or line, more or less interrupted.

Subsequently the upper surface of the head and of abdominal segments 1 and 2 darkens and the greenish postocular spots appear before the black mid-dorsal thoracic stripe.

♀ (not hitherto described). Labium, under and rear surfaces of head, and genæ pale yellow; vertex and frons olive, the latter paler

inferiorly; ill-defined greenish postocular spots, yellow of rear of head immediately adjoining dotted with black, nasus and labrum obscure olive.

Prothorax greenish-brown, the grooves and sutures occupied by dark lines, a curved brown mark on each side of the middle lobe; meso-metathorax greenish, its markings as above described for the younger males.

Abdominal segment 1 yellowish, with a dorsal black spot; 2-10 at first yellow, later red, with the following black markings: a transverse line on the intersegmental articulations beginning with that between 2 and 3; an isolated transverse mark on the dorsum of 2 at two-thirds' length; a spot at the fifth sixth of 3 and 4, not reaching back to the hind end of the segment, but in some prolonged more or less forward as a fine mid-dorsal line; a rounded spot on the hind fifth of 5 and 6, in some prolonged forward, in others as a narrow mid-dorsal stripe almost to the base of each; nearly all of the dorsum of 7-10.

Hind margin of 10 narrowly cleft mid-dorsally about one-third way toward the anterior end. Appendages shorter than 10, conical, black. A ventral apical spine on abdominal segment 8. Genital valves yellow, reaching caudad almost to the level of the hind end of 11 (anal tubercle), their "palps" dark, reaching beyond the level of the tips of the abdominal appendages.

Legs as above described for the younger males. Pterostigma ochre-brown, oblique.

With age the browns of the body generally become darker and duller, vertex obscure blackish, but no black mid-dorsal thoracic band forms as in the male.

♂♀. Pterostigma in the majority of both sexes with the costal edge longest, but with a tendency (more marked in the hind wings and in the examples from Sapucay) to have the costal edge occasionally equal to, or even shorter than, the proximal or distal edges. Vein A (= inferior sector of the triangle of de Selys) separating from the hind margin of the wings at, or slightly distal to, the cubito-anal cross-vein (= basal postcostal of de Selys).  $M_2$  (= nodal sector of de Selys) arising nearest the fourth postnodal (occasionally the fifth) on the hind wings. Postnodals, 10 ♂, 5 ♀, Chapada, front wings, ♂ 10-11 (11), ♀ 9-11 (11); hind wings, ♂♀ 8-10 (9). Postnodals, 7 ♂, 2 ♀, Sapucay, front wings, ♂ 11-12 (12), ♀ 11-13 (13); hind wings ♂ 9-10 (10), ♀ 10-11 (10). Parentheses enclose the numbers of greatest frequency.

*Dimensions in millimeters:* Abdomen ♂ 26.5–28 (Chapada), 26.5–29.5 (Sapucay); ♀ 27 (Chapada), 26–27 (Sapucay). Hind wing ♂ 17–19 (Chapada), 18–19.5 (Sapucay); ♀ 18–19.5 (Chapada), 19 (Sapucay). Width of tip of bifid dorsal process of abdominal segment 10 of ♂, rear view, .66; maximum width of segment 10 of ♂, rear view, .84.

*Habitat:*—BRAZIL, Sete Lagoas, Minas Geraes, May 3 and 4, 1908, by J. D. Haseman, 2 ♂. Carnegie Museum, Pittsburgh.

Chapada, by H. H. Smith, 8 ♂ and parts of 20 others, 1 ♀ and parts of 4 others; collector's numbers 11, 16, 115, 189, 197. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, by W. T. Foster, November, 1899, to February, 1900, 6 ♂, 2 ♀, January 17, 1903, 1 ♂ numbered 59 (other males numbered 59 are *Oxyagrion impunctatum* n. sp.). U. S. National Museum.

#### 94. *Oxyagrion impunctatum*, sp. nov.

(PLATE III, FIGS. 56, 57.)

♂. Vertex obscure, brownish, with traces of a pale spot on each side somewhat anterior to the area occupied by the postocular spot in allied genera; face carmine red; labium and rear of head yellow.

Prothorax brownish-yellow, its grooves and sutures occupied by black lines, its hind margin low, convex. Dorsum of meso-metathorax reddish brown or olive; sides and pectus paler, greenish-yellow; a short black mark at the upper ends of the humeral and lateral sutures.

Abdominal segments 1 and 2 yellowish, brown or red above; a pair of small mid-dorsal blackish spots on 1, a transverse dorsal blackish mark at three-fourths' length of 2; 3–10 red, more obscure on 7–10; a transverse black line on the intersegmental articulations of 3–6 in some.

Segment 10 and the appendages very similar to those of *O. basale*, *i. e.*, hind dorsal margin of 10 broadly excised in a concave curve, margins of the excision elevated and produced at the hind end on each side into an acute process, which is directed more nearly upward (dorsad) and not so much caudad and dorsad as is the case in *O. basale*; in rear view also this dorsal process is very similar to that of *O. basale*, but its lateral margins are nearly parallel, instead of diverging as in *O. basale*.

Superior appendages directed downward (ventrad) as well as caudad,



slightly longer and slenderer than those of *O. basale*; apex rounded in profile view; an upper-inner basal process terminating in a black tip, which is applied against the tip of the process of the appendage of the opposite side of the body.

Inferior appendages, in profile view, reaching caudad to very little more than half the level the superiors, tapering rapidly in the basal half of each, distal half very slender, curved upward and inward, a little more strongly than in *O. basale*.

Legs yellowish, with an anterior dark stripe on femora and tibiae, narrower and interrupted on the latter; third tibia with 7-8 black spines in the outer (anterior) row.

Wings clear, veins brown; stigma red, oblique, varying in its proportions in that the costal edge is longer than, equal to, or shorter than the proximal or distal edges in different individuals. Vein A (= inferior sector of the triangle of de Selys) separating from the hind margin of the wings distal to, or less frequently at, the cubito-anal cross-vein (= basal postcostal of de Selys).  $M_2$  (= nodal sector of de Selys) arising on the hind wings nearest the fifth postnodal, or more distad. Postnodals, 9 ♂, Chapada: front wings 10-12 (12), hind wings 9-11 (10); 5 ♂, Sapucay: front wings 12-15 (12), hind wings, 10-13 (11). Parentheses enclose the numbers of greatest frequency.

*Dimensions in millimeters*: abdomen 27.5-28.5 (Chapada), 28-30 (Sapucay); hind wing 17.5-19.5 (Chapada), 19.5-21 (Sapucay); width of tip of dorsal process of abdominal segment 10, end view, .48; maximum width of 10, end view, .76.

♀ unknown.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 2 ♂ and parts of 7 others, some dated May, some numbered 93 and 185. Carnegie Museum, Pittsburgh.

São Paulo, by A. Hempel, September 7, 1900, 1 ♂. Academy of Natural Sciences of Philadelphia.†

PARAGUAY, Sapucay, by W. T. Foster, January 16, 1903, 5 ♂, no. 59 (one other ♂ numbered 59 is *O. basale*). United States National Museum.

This species very much resembles *O. basale*, with which it was united by Mr. Foster under the same collection number. As the dates of collection at Sapucay are not identical, but differ by one day, it is probable that the two species do not occur in the same topographical

locality. The absence of black dots on the thoracic dorsum, which has suggested the specific name *impunctatum*, renders this species easy to distinguish from *O. basale*.

It is worthy of note that in *O. impunctatum* as in *O. basale*, specimens from Sapucay tend to larger size and greater number of post-nodals than in those from Chapada.

#### Genus TELEBASIS.

##### Group of *T. corallina*.

(The present material contains a number of forms closely related to *T. corallina* (Selys). It seems convenient to first give the common characters of these species, and then to limit the description of each form to those features in which it differs from its allies.)

Rear of the head pale, abdomen red, each mesepisternum with a dark metallic-green stripe *contiguous* to mid-dorsal carina.

1. Superior appendages of the male longer than the tenth abdominal segment, inferior appendages distinctly shorter than the superiors, dorsum of abdominal segments I and 2 at least not distinctly blackish; upper surface of the head dark metallic-green, with an oblique red line or streak between each lateral ocellus and the antenna of the same side, and a transverse reddish line or stripe bordering the postero-superior dorsal margin of the occiput.

*corallina* (Selys), *carmesina* n. sp., *sanguinalis* n. sp.

2. Superior appendages of the male as long as the tenth abdominal segment, inferior appendages subequal in length to the superiors, dorsum of abdominal segment I and of the anterior half of 2 blackish or blackish-brown; upper surface of the head dark metallic-green, its markings as indicated below.

*coccinata* n. sp., *carminita* n. sp., *coccinea* (Selys)

#### 95. *Telebasis corallina* Selys.

(PLATE V, FIG. 99.)

*Erythragrion corallinum* Selys, Bull. Acad. Belg. (2) xlii, p. 964. 1876.

*Telebasis corallina* Kirby, Cat. Odon., p. 155. 1890.

♂. Transverse reddish occipital stripe terminating on each side in a larger reddish spot.

Labrum bluish-green ("lèvres jaunâtres" Selys).

Prothorax entirely reddish.

Mid-dorsal thoracic carina reddish, the dark metallic-green stripe on each side of the carina one-third as wide as the mesepisternum on which it lies, remainder of mesepisterna and mesepimera reddish, metapleura greenish-yellow.

Superior appendages, in profile view, with the upper margin strongly

convex and semicircular, apex with no acute recurved tooth, each appendage constricted in its basal third on the lower side, which is then abruptly dilated beyond, showing no tooth in profile view; but in a supero-internal view an acute not recurved tooth (Selys says "dent arrondie") is visible at mid-length of the inner-lower margin.

Front wings with 9 postnodals (9-11 Selys), hind wings with 8-9.

♀. Unknown to me. Selys describes no prothoracic processes, no dorsal dark markings on abdominal segments 1 and 2, and states of the "valvules vulvaires . . . dépassant un peu l'abdomen." (Cf. *T. sanguinalis*, *postea*.)

Abdomen ♂ 25.5 (23-26, ♀ 23-25, Selys); hind wing ♂ 16 (15-17, ♀ 15.5-18 Selys) mm.

*Habitat*: — BRAZIL, Bahia, 1 ♂ ex coll. Winthem, Museum of Comparative Zoölogy, Cambridge, Maas.

Selys' material was from S. Joas del Rey, Santa Cruz, and the Province of Rio.

#### 96. *Telebasis carmesina* sp. nov.

(PLATE V, FIGS. 100, 100a.)

♂. Transverse reddish occipital stripe not enlarged into a spot on each side. Labrum bluish-green.

Middle of the front lobe, posterior part of the middle lobe and the entire hind lobe of the prothorax dark green. Mid-dorsal thoracic carina reddish, the dark metallic-green stripe on each side of the carina three-fifths to three-fourths as wide as the mesepisternum on which it lies, remainder of mesepisterna and mesepimera reddish, metapleura yellowish.

Superior appendages, in profile view, with the upper margin strongly convex, descending more abruptly and more vertically at the hind end to form an apical margin, which by its junction with the lower margin forms a subacute recurved tooth; difference in thickness between the proximal third and the remainder of the appendage less than in *T. corallina*, but with a moderately acute recurved tooth at one-third length on the lower margin, visible in profile as well as in supero-internal view.

Front wings with ten postnodals (nine on one wing), hind wing with nine (eight in one wing).

Abdomen 22, hind wing 14-15 mm.

♀ unknown.

*Habitat*: — BRAZIL, Sete Lagoas in Minas Geraes, May 4, 1908, by J. D. Haseman, 1 ♂. Chapada, by H. H. Smith, 1 ♂ numbered 144. Carnegie Museum, Pittsburgh.

A male from São Paulo, Brazil, by A. Hempel (Academy of Natural Sciences of Philadelphia), taken September 14, 1900, has the occipital stripe, the prothorax and the dark metallic-green mesepisternal stripes as in *T. corallina*, the labrum yellow, the superior appendages as in *T. carmesina*, 10 postnodals on the front wing, 8 on the hind, abdomen 22.5 mm., hind wing 16 mm.

97. *Telebasis sanguinalis* sp. nov.

(PLATE V, FIG. 101.)

♂. Transverse reddish occipital stripe enlarged, or not enlarged, on each side into a reddish spot. Labrum bluish-green.

Prothorax with a metallic-green spot on the middle of the front lobe, middle lobe with a mesially convex metallic-green stripe on each side of its dorsum, or the dorsum dark metallic-green with a reddish spot on each side; hind lobe dark metallic-green with yellow margins. Mid-dorsal thoracic carina reddish, the dark metallic-green stripe on each side of the carina one-third to two-fifths as wide as the mesepisternum on which it lies; remainder of mesepisterna and mesepimera reddish; metapleura pale bluish or yellowish.

Superior appendages, in profile view, with the upper margin moderately convex, its proximal half almost straight, its distal half not descending abruptly, no constriction or teeth on the almost straight lower margin visible in the ordinary resting position, but on raising the superiors the extreme base of the lower margin is seen to be abruptly constricted, an acute infero-internal forwardly-directed tooth marking the beginning of the enlargement, apex rounded.

♀. Transverse reddish occipital stripe enlarged on each side into a spot which is quite large in some. Labrum yellowish.

Prothorax pale reddish-brown or reddish-yellow, hind lobe with two slender thin processes directed forward and applied for their whole length against the dorsal surface of the middle lobe reaching to one-half of its length.

Thoracic dorsum and abdomen less red, more yellow; a mid-dorsal blackish spot on abdominal segment 1; a fine blackish or brown mid-dorsal line on 2 connecting a mid-basal spot with a transverse brownish streak at three-fourths' length. Hind margin of 10 cleft mid-

dorsally to more than half-way toward base. Appendages as long as 10. No vulvar spine on 8. Genital valves hardly reaching the level of the hind end of 11.

♂♀. Front wings with 8-10 postnodals (9 most frequent); hind wings with 7-8 (8 most frequent).

Abdomen ♂ 21-23, ♀ 23-24; hind wing ♂ 14-15, ♀ 15.5-16.5 mm.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 9 ♂ and parts of 14 others, 4 ♀; some numbered 10, 44, 82 or 144 by the collector. Carnegie Museum, Pittsburgh.

One male has the dark metallic-green of the upper surface of the head extending well down on the rear, thereby reducing the area of yellow.

98. **Telebasis coccinata** sp. nov.

(PLATE V, FIGS. 103, 103s.)

♂. No transverse reddish occipital stripe, red line between each lateral ocellus and the antenna of the same side very fine or wanting. Labrum bluish-green.

Prothorax dark metallic-green, middle lobe pale blue inferiorly, extreme hind margin of hind lobe reddish.

Mid-dorsal thoracic carina black (or reddish in two specimens), the dark metallic-green stripe on each side of the carina two-thirds to four-fifths as wide as the mesepisternum on which it lies; remainder of mesepisterna and adjacent part of mesepimera reddish, but most of mesepimera and metapleura pale blue.

Abdominal segment 1 blue on the sides.

Superior appendages, in profile view, with the upper margin gently curved downward in the distal three-fourths to meet the almost straight lower margin in a subacute apex.

Front wings with 9-11 postnodals, hind wings with 8-9 (8 most frequent).

Abdomen 20.5-21.5, hind wing 13-14.5 mm.

♀ unknown.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 2 ♂ and parts of 2 others, some dated May. Carnegie Museum, Pittsburgh.

Minas Geraes, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

99. *Telebasis carminita*, sp. nov.

(PLATE V, FIG. 102.)

♂. Transverse reddish occipital line present, slender. Labrum bluish-green.

Prothorax as in *T. coccinata*.

Mid-dorsal thoracic carina reddish, the dark metallic-green stripe on each side of the carina covering from three-fourths to nearly all of the mesepisternum on which it lies, leaving only a reddish line bordering the lower three-fourths of the humeral suture, mesepimera reddish, metapleura bluish.

Superior appendages, in profile view, triangular, upper margin slightly convex, almost straight, apical margin slanting ventrad and cephalad, forming a recurved tooth where it meets the concave lower margin, appendage much narrower at base than at one-third length.

Front wings with 8 or 10 postnodals, hind wings with 7.

Abdomen 18-18.5, hind wing 11.5 mm.

♀ unknown.

*Habitat*: — BRAZIL, Cuyabá, 1 ♂; Cachoeiro Cuyabá, flooded campo, January 26, 1 ♂, no. 9. Both by H. H. Smith. Carnegie Museum, Pittsburgh.

100. *Telebasis coccinea*.

*Erythragrion coccineum* Selys, Bull. Acad. Belg. (2) xlii, p. 965. 1876.

*Telebasis coccinea* Kirby, Cat. Odon. p. 155. 1890.

Not known to me; the following is drawn from de Selys' description.

♂. No transverse reddish occipital stripe.

Labrum orange-red.

Prothorax bronze-black except a large orange spot on the sides.

Mid-dorsal thoracic carina black, the bronze-black stripe on each side of the carina covering all of the mesepisternum on which it lies, except for an orange ray on the humeral suture.

Superior appendages, in profile view, compared with those of *T. corallina* "appear narrower at the base and their inferior dilatation much less wide."

♀. Occipital stripe and labrum as in the ♂.

Prothorax brown.

Mid-dorsal thoracic carina black, the mesepisternal black stripe not covering all of that sclerite.

Abdominal dorsum obscure olive-brown, narrower on 9, absent on 10; articulations, ventral surface, all of 10, and the appendages reddish.

Abdomen ♂ 20-21, ♀ 23.5; hind wing ♂ 13.5-14, ♀ 16 mm.

BRAZIL, Minas Geraes.

*TIGRIAGRION*<sup>24</sup> genus novum. (Legion *Agrion* Selys.)

Arculus at, or very near to, the second antenodal;  $M_2$  (= nodal sector, Selys) on the hind wings arising nearest the fourth postnodal; costal edge of the stigma of the hind wings shorter than the proximal or distal edges;  $Cu_1$  and  $Cu_2$  (= upper and lower sectors of the triangle) not reaching as far distad as the levels of origin of  $M_{1a}$  and  $M_2$  (= ultranodal and nodal sectors); A (= lower or inferior sector of the triangle) separating from the hind margin proximal to, or less frequently at, the cubito-anal cross-vein (= basal postcostal), which is situated nearer to the level of the first than to that of the second antenodal; venation of the tips of front and hind wings similar, abdomen chiefly red, tenth segment of the male not elevated dorsally, vulvar spine?

Type: *Tigriagrion aurantinigrum*, sp. nov.

101. ***Tigriagrion aurantinigrum***, sp. nov.

(PLATE V, FIGS. 104, 105; PLATE VIII, FIG. 143.)

♂. Head and thorax orange-red, with the following black markings: a line on the fronto-nasal suture; a transverse frontal line; a narrow ring almost encircling each ocellus; a fine ring surrounding the three ocelli, giving off on each side a stripe toward, but not to, the antenna, and confluent with a transverse stripe behind the lateral ocelli, which stripe is prolonged at each end obliquely forward to the eye of the same side; a curved stripe on each side (confluent or not confluent with the transverse stripe) almost surrounding, except on the inner (mesial) side, an orange area corresponding to the pale postocular spot of allied genera, this area dotted with black; most of the middle prothoracic lobe (leaving a pair of short median lines and a larger spot on each side orange); a stripe on each side of the mid-dorsal carina (which remains orange) two-fifths as wide at mid-height as the mesepi-

<sup>24</sup> From *τίγρις* and *Agrion*, in allusion to the black and orange markings of the head and thorax of the type species. The nearest ally of *Tigriagrion* is perhaps *Telebasis* (Selys) Kirby (= *Erythrogrion* Selys).

sternum on which it lies ; a much narrower antehumeral stripe reaching downward from the upper end of the humeral suture half to three-fifths of the way to the lower end of the sclerite, or absent, except at the upper end of the humeral suture ; a mesepimeral stripe half as wide as its sclerite, usually confluent above with the antehumeral, not touching the humeral suture in most of its length, and continued across the mesinfraepisternum, on which it is narrower ; a short mark at the upper ends of the obsolete first and of the second lateral thoracic sutures, and smaller isolated marks or dots below these in some specimens.

Dorsum of abdominal segments 1-10 black, the black widening on the sides at the apices of 3-5 ; the intersegmental articulation of 1 and 2, a narrow transverse basal ring on 3-7, and an indistinct mid-dorsal spot on 9, yellow ; sides inferiorly and ventral surfaces of the abdominal segments orange. Hind margin of segment 10 with a small semi-circular mid-dorsal excision, but not at all elevated.

Superior appendages shorter than 10, blackish, in dorsal view rather distant, moderately divergent (in specimens in which no attempt to arrange them for easy inspection has been made), narrower at the obtuse apex than at the base ; in profile view directed caudad, but only slightly ventrad, straight, each one about twice as long as thick at the middle, apex obtuse.

Inferior appendages in profile view twice as thick at base as are the superiors, apical half much slenderer, directed upwards, slightly recurved and hooked at the extreme apex, which reaches to the level of three-fifths of the length of the superiors ; in ventral view pale brownish-yellow, the slender apical half forming a process on the outer edge and curved somewhat toward its fellow of the opposite side.

Legs orange, all the femora and tibiæ anteriorly and much of each tarsus black, 6-7 spines in the anterior row of the third tibia.

♀. Differs from the description of the male as follows : black antehumeral stripe faint, except the spot on the upper end of the humeral suture from which it starts, mesinfraepisternal continuation of the mesepimeral stripe hardly narrower. (Abdominal segments 7-10 lost.) Hind margin of the prothorax in both sexes low, convex, entire.

♂♀. Wings clear, stigma brownish-yellow, surmounting less than one cell, distal edge distinctly convex and forming a much less acute angle with the costa than does the proximal side, stigma of the hind wing larger than that of the front, its costal edge shorter than the proximal or distal edge ; on the front wings the costal edge varies from



longer to shorter than the proximal or distal edge, no one proportion existing in a majority of the specimens. Anal vein separating from the hind margin of the wings proximal to the cubito-anal cross-vein in the greater majority of cases, but at a varying distance. Postnodals on the front wings 8-9 (8 more often), on the hind wings 6-8 (7 more often) ;  $M_2$  on the hind wings arising nearest the fourth postnodal (90 per cent.).

Abdomen ♂ 18.5-20.5, ♀ ? ; hind wing ♂ 12-13, ♀ 13.5 mm.

*Habitat* : — BRAZIL, Chapada, by H. H. Smith, 4 ♂ and parts of 5 ♂, 1 ♀, numbered 43 by the collector, one male dated May. Carnegie Museum, Pittsburgh.

#### Genus METALEPTOBASIS.

Calvert, Biol. Centr.-Amer. Neurop., p. 386. 1907.

Additional material indicates that the character drawn from the anal vein (= inferior sector of the triangle of de Selys) as originally given for this genus is variable. The other diagnostic features hold true, viz. :  $M_2$  (= nodal sector of de Selys) arising nearest the fifth or sixth postnodal on the hind wings, the sixth or more remote on the front wings, tarsal claws toothless, superior appendages of the male not bent down almost at a right angle in their apical half, genital valves of the females not reaching far beyond the level of the tips of the abdominal appendages.

#### 102. *Metaleptobasis diceras*.

(PLATE VI, FIGS. 106, 107, 114.)

*Leptobasis diceras* Selys, Bull. Acad. Belg. (2) xliii, p. 102. 1877.

♂. The male described by de Selys (from Para) lacked the last four abdominal segments. The following notes are added from a male of what seems to be the same species :

Abdominal segment 7 similar to 6, *i. e.*, pale brown, darker at the hind end, perhaps with metallic-blue reflection in an older stage ; 8-10 pale (blue?), the three together (3 mm.) only three-fifths as long as 7. Hind dorsal margin of 10 entire, very slightly elevated in the middle.

Superior appendages slightly shorter than 10, in dorsal view curved regularly toward each other, each decreasing slightly in width from base to the obtusely truncated apex ; in profile view, each appendage

is nearly horizontal, slightly contracted at mid-length, gradually thickened to the apex, which is a little thicker than the base and truncated from above downward (ventrad) and backward (caudad), but not so obliquely as to produce an acute apex.

Inferior appendages in profile view conical, directed slightly upward and reaching to mid-length of the superiors; in ventral view each appendage, otherwise pale yellow, has an inner acute apical straight black edge.

Postnodals on the front wings 12, on the hind 11;  $M_2$  (= nodal sector) arising nearest the sixth postnodal on both front and hind.

Abdomen 38.5, hind wing 22 mm.

*Habitat*: — BRAZIL, Bahia, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

See also the remarks under *M. bicornis*.

### 103. *Metaleptobasis bicornis*?

(PLATE VI, FIGS. 108, 109.)

*Leptobasis bicornis* Selys, Bull. Acad. Belg. (2) xliii, p. 103. 1877.

This species was described from a single female. A male which I provisionally refer here lacks the last four abdominal segments and differs from the description of the female as follows:

Hind margin of prothorax low, very feebly trilobed, lobes subequal. Each mesepisternum bears a slender straight horn directed laterad and hardly at all cephalad or dorsad, thus differing from the similar processes of *M. diceras* and of *M. bovilla*<sup>25</sup> from Nicaragua, as in *M. diceras* each horn is directed laterad, dorsad, and cephalad, the last more especially in its distal half, and in *M. bovilla* each process is "directed forward [cephalad] and upward [dorsad] . . . subparallel with its fellow of the other side for half its length, then diverging therefrom and curved outward (laterad)."

Mid-dorsal thoracic band of the same width (.32 mm.) as in *M. diceras* ♂ above described, but metallic-green instead of metallic-blue.

Quadrilateral on the front wings with the anterior side two-fifths as long as the posterior, (not two-thirds as de Selys says, but a comparison of his statement for the same parts on the hind wing suggests that this may be an error), 11 postnodals on all the wings,  $M_2$  arising nearest the sixth on the front wings, the fifth on the hind.

<sup>25</sup> Calvert, Biol. Centr.-Amer. Neuropt., p. 386, pl. vii, figs. 21-23. 1907.

Abdominal segments 1-6, 29 mm., hind wing 21.5 mm.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 1 imperfect ♂ numbered 190 by the collector. Carnegie Museum, Pittsburgh.

104. ***Metaleptobasis cornicauda*** sp. nov.

(PLATE VI, FIGS. 110, 111.)

♂. Dark metallic-blue or green, the following pale yellow: rhinarium, genæ below the level of the frons, a narrow stripe on the site of the obsolete first lateral thoracic suture not reaching to the wing bases, a shorter similar stripe bordering the lower half of the posterior margin of the metepisternum, these two stripes confluent below with the yellow of the pectus, a dot near the upper end of the sclerite, nearly all the metepimeron (except for a blackish mark in the middle of its lower half), pectus (except for a mid-ventral longitudinal black stripe and a black metasternal stripe bordering the latero-ventral metathoracic carina), much of the ventral surfaces of abdominal segments 1-7 (except the hind end of each) confluent with a narrow transverse mid-dorsally interrupted basal yellow ring on at least 4-6, coxæ posteriorly and mesially, tibiæ superiorly.

Hind prothoracic margin low, convex, entire, no pro- or mesothoracic horns.

Tenth abdominal segment twice as long dorsally as ventrally, its dorsal length half that of 9, middle of the hind dorsal margin produced dorsad and caudad to form a triangular process, best seen in rear view, and then having a rounded tip, but viewed dorsally the tip is bifid.

Superior appendages stout, in dorsal view a little longer than 10, subparallel, and each of subuniform width in the proximal two-thirds, widened in the distal third, especially on the inner (mesial) side, curved toward each other, apex truncated obliquely from within caudad and laterad. Each appendage is for its entire length concave within and convex without, and in profile view its outline is capitate, the "head" occupying about the distal half.

Inferior appendages in profile view conical, directed straight caudad, apices acute, and reaching to the level of one-third of the length of the superiors; in ventral view the acute apices are curved slightly toward each other.

Third tibia with 6 spines in the anterior (outer) row.

Wings clear, stigma brown, margined with a pale line inside the bound-

ing veins, surmounting one cell, proximal edge more oblique than the distal, posterior edge the longest, costal edge next in length. Anterior side of the quadrilateral two-fifths (front wings) or three-fifths (hind wings) as long as the posterior side. Front wings with 16 postnodals,  $M_2$  arising nearest the seventh; hind wing with 14 postnodals,  $M_2$  arising nearest the sixth. Anal vein separating from the hind margin distal to the cubito-anal cross-vein by a distance less than the length of that cross-vein, which is situated nearer the second than the first antenodal.

The single individual at hand is pruinose on the ventral surface and inferiorly on the sides of the thorax, on the coxæ, and on abdominal segments 9 and 10.

Abdomen 50 mm., hind wing 27 mm.

♀ unknown.

*Habitat*: — BRAZIL, Bahia, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

*M. cornicauda* is allied to *Leptobasis macilenta* (Rambur) Selys, which probably is also a *Metaleptobasis*. The description of *macilenta* refers to a much smaller insect (abd. 35, hind wing 19.5 mm.) with fewer (12–13) postnodals, border of segment 10 deeply excised in the shape of a broad V, and superior appendages thicker at the base than elsewhere; its habitat is no more definite than “Brésil.”

#### 105. *Leptobasis vacillans* Selys.

*Leptobasis vacillans* Selys, Bull. Acad. Belg. (2) xliii, p. 101. 1877. Calvert, Biol. Centr.-Amer. Neurop. pp. 120, 385, pl. v, figs. 22–25. 1902, 1907.

What appears to be this species, hitherto not recognized in South America, is represented by specimens from Paramaribo having darker colors on parts of the body, perhaps as the accompaniment of greater maturity, than existed in material previously described.

♂♀. Dorsum of the abdomen marked with bronze-green as follows: hindmost fifth of 4 and nearly all of 5–7, except a narrow transverse basal mid-dorsally interrupted yellow ring on each, and the hind end of 7, which is reddish. One male, moreover, has most of the nasus (leaving its free margin pale blue or green), the frons superiorly (but not inferiorly) and the vertex superiorly blackish, the last with some reddish reflection; and on each side a moderately sized blue postocular spot widely confluent with the blue of the rear of the head; the other male and one female have the head entirely reddish superiorly. The

other female has the nasus and the upper surface of the head olive, with blue postocular spots as above described, and the dark markings on the abdominal segments are merely dull brown. Neither female has a vulvar spine, but the posterior ventral margin of 8 is convex. Abdomen ♂ 26.5-27.5, ♀ 27; hind wing ♂ 14.5-15, ♀ 17 mm.

*Habitat*:—DUTCH GUIANA, Paramaribo, by Miss Katherine Mayo, 2 ♂, 2 ♀. Academy of Natural Sciences of Philadelphia.

Specimens from Ecuador also appear referable to this species, but have a greater extension of dark colors:

♂♀. Dorsum of abdominal segments 4-7 dark metallic-green, except for a narrow transverse mid-dorsally interrupted basal yellow ring on each and, in some at least, the hind end of 7, which is reddish. The head is a little wider (3.12-3.44) than in typical *vacillans* from Cuba and Guatemala (2.72-2.88 mm.), the examples from Paramaribo being intermediate in this respect (3-3.12 mm.). One of the three females has a very minute vulvar spine, the other two lack this feature, but the posterior ventral margin of 8 is strongly convex in all three.

Abdomen ♂ 28-29, ♀ 27.5-28.5; hind wing ♂ 15-16, ♀ 17 mm.

*Habitat*:—ECUADOR, Guayaquil, 5 ♂, 2 ♀, and Quevedo, 5 ♂, 1 ♀, all by Prof. F. Campos R. Academy of Natural Sciences of Philadelphia.

If it be desirable to distinguish these forms of *vacillans* by sub-specific names (and of this I am not yet assured), those of *guianæ* and *ecuadorica* may be suggested.

#### 106. *Leptobasis mammilaris* sp. nov.

(PLATE VI, FIGS. 112, 113, 115-117.)

♂. Dorsum of head and of thorax reddish-yellow, the following pale green or blue: genæ, rear of head, antehumeral stripe (one-fourth to one-fifth as wide as its mesepisternum), and a stripe on the metepisternum and adjacent part of the mesepimeron; labium, metepimera, and pectus pale yellow.

Hind margin of prothorax trilobed, median lobe widest and most prominent, rounded, but not greatly produced.

Mesostigmal laminae well, but not excessively, developed, vertical. Behind each lamina on the anterior or lower end of each mesepisternum is a distinct rounded tubercle, situated between the fork of

the anterior end of the mid-dorsal carina and the pale green antehumeral stripe.\*

Abdomen brownish-yellow, a little darker dorsally, especially on segment 7; hindmost eighth of 3-6 darker brown, a fine black transverse ring on the intersegmental articulations of 3-6. A pale green lateral longitudinal stripe on 1 and 2 of the damaged male only. Hind margin of 10 neither excised, nor elevated.

Superior appendages half as long as 10, in dorsal view appearing as reddish rounded tubercles; in profile view the upper margin is straight, ascending, apex wider than base and prolonged downward (ventrad) in a long acute perpendicular process.

Inferior appendages reddish-yellow, in profile view straight, slender, acute, reaching half again as far beyond the level of the superiors, extreme apex black; in ventral view each appendage is curved somewhat toward its fellow of the opposite side.

Legs yellow, spines black, 6 in the anterior (outer) row of the third tibia, tooth of the tarsal nails very small.

Wings clear, veins brown, stigma pale grayish-brown, surmounting considerably less than one cell, distal edge more oblique than the proximal and convex, costal edge longest. Quadrilateral of the front wings with the anterior side subequal to the proximal and less than half as long as the posterior side; of the hind wings with the anterior side half as long as the posterior. Anal vein (= inferior sector of the triangle of de Selys) separating from the hind margin distal to the cubito-anal cross-vein by a distance equal to or less than the length of the cross-vein itself, this cross-vein placed nearly midway between the levels of the two antenodals. Postnodals on the front wings 10, on the hind 9.

♀. An individual from Rio de Janeiro may belong here, and differs from the preceding description of the male as follows: Hind margin of prothorax not trilobed; but produced medially and bilobed; mesostigmal laminæ nearly horizontal, projecting forward, the antero-external angle rounded; no mesepisternal tubercles; dorsum of abdominal segments 3-7 dark brown (except for a mid-dorsally interrupted pale basal ring); widened down on the sides in the hindmost sixth of 3-6; 2 with a mid-dorsal brown line stopping at a transverse brown line at four-fifths of the length of the segment; abdominal ap-

\* This tubercle is placed not quite as far laterad as the mesepisternal tubercle of females of certain species of *Argia*. (Cf. *Biol. Centr.-Amer., Neurop.*, p. 68.)

pendages a little shorter than 10, straight, simple, apices acute, hind margin of 10 moderately elevated mid-dorsally, when viewed from the rear; 8 postnodals on the hind wings.

No vulvar spine, although the posterior ventral margin of 8 is strongly convex. Genital valves 1.8 mm. long (excluding "palps"), reaching beyond the level of the tips of the abdominal appendages.

*Dimensions*: abdomen ♂ 28.5, ♀ 29; hind wing ♂ 16, ♀ 19.5 mm.

*Habitat*:—BRAZIL, Chapada, 1 ♂ and part of 1 other; Rio de Janeiro, 1 ♀, all by H. H. Smith. Carnegie Museum, Pittsburgh.

### 107. *Amphiagrion titicacæ*, sp. nov.

(PLATE VI, FIGS. 118-120.)

♂. Head and thorax brownish-yellow, the latter reddish-brown in older stages, the following black: antennæ beyond the third joint, central portion only of the upper surface of the head (leaving the area between the three ocelli and a narrow stripe from each lateral ocellus toward the antenna of the same side yellow), or the black may extend out to the eyes as well as obliterate the yellow ocellar-ocular stripe, a mark on each side of the middle lobe of the prothorax, the small area between the mesostigmal laminæ, a line on the upper end of the humeral suture. Lips, underside of head and of thorax, a more greenish-yellow.

Median third of hind margin of prothorax produced caudad and dorsad, and truncated, or slightly bilobed. A prominent, rounded, hairy metasternal tubercle.

Head, thorax, legs (in addition to the usual biserial black spines), and ventral surface of the first three abdominal segments with many long soft hairs, whitish on the underside of the head and on parts of the legs, brownish elsewhere.

Dorsum of abdominal segments 1-6 coral-red, of 7-10 blue, the following black: a fine transverse ring at most of the intersegmental articulations, a transverse stripe (interrupted or absent in some) at three-fourths of 3 and of 4, a wider similar curved band (or very small in some) on the same part of 5, the hindmost third or fourth of 6, a longitudinal lateral stripe on the posterior two-thirds or half of 7 and for the whole length of 8-10, which stripe sends up a slender vertical branch at three-fourths' length of 7 and at nearly mid-length of 8 and

9, while on 10 it, with its ascending branches, encloses a round, blue spot on each side of the dorsum, or the two spots are confluent. 3-6 have a narrow transverse basal yellow ring and the sides inferiorly of most of the abdominal segments are yellow, more obscure nearer the hind end of the abdomen.

Hind margin of 10 with a small mid-dorsal excision, not elevated. Superior appendages subequal in length to 10, reddish, hairy, in dorsal view conical, apex subacute, and, owing to the hairs, having the appearance of being slightly incurved; in profile view each is somewhat mitten-shaped, the "thumb" being represented by an inferior process, directed caudad, at about three-fifths of the length.

Inferior appendages in profile view conical, directed somewhat upward as well as caudad, not quite reaching to the level of the tips of the superiors, yellow; in ventral view the outer side is prolonged to form the chief part of each appendage, and is curved slightly toward its fellow of the opposite side, with a small blackish hook on the mesial side at apex.

Legs brownish yellow, 7 spines in the anterior row of the third tibia, tooth of the tarsal nails very small.

Wings clear, veins brownish-yellow, stigma yellow, moderately oblique, surmounting one cell or less, rather distant proportionally (2 mm.) from the wing-tip, costal edge longer than the proximal or distal edge on the hind wing and often also on the front wing. Anal vein separating from the hind margin of both front and hind wings at least as far proximal to the cubito-anal cross-vein as the latter is long; 8-10 (10 most frequent) postnodals on the front wings, 6-8 (8 most frequent) on the hind.  $M_2$  on the hind wings arising nearest the fourth or third postnodal.

♀. Differs from the description of the male as follows: Hind margin of prothorax trilobed, median lobe not as prominent as the corresponding part of the male; dorsum of abdominal segment 10 elevated into a median ridge; appendages reddish or yellowish, as long as 10; vulvar spine present, genital valves pale, reaching caudad not beyond the level of the hind end of 10; 7-10 postnodals on the front wings, 9 most frequent; 6-8 on the hind wing, 8 most frequent.

The differences in color between the two sexes are confined to the abdomen, but the females show differences among themselves by which, as in other genera, they may be grouped as similar to, or markedly different from, the males in abdominal markings.



*Homæochromatic* females have the abdomen colored similarly to that of the males, differing as follows: a transverse mid-dorsally interrupted black stripe similar to that on 3 and 4 may be present at three-fourths' length of 2; posterior dorsal fourth to two-fifths of 5 black, in one with a fine mid-dorsal prolongation reaching forward to one-fourth length of the segment from the base; posterior dorsal three-fifths to four-fifths of 6 pointed anteriorly; the lateral longitudinal black stripe on 7 occupying only the hindmost third or fourth, on 8 only the posterior three-fourths to three-fifths, on 9 only the anterior three-fifths; or, 9 may be blue, with a black stripe on each side of the *dorsum* for the entire length of the segment, this black stripe wider than in the male, narrowing posteriorly and with no vertical branch; or, 9 may be black dorsally, with a median pale line; 10 pale, with a transverse basal dorsal black stripe, or black dorsally, with a pale mid-dorsal line.

*Heterochromatic* females have the abdomen colored quite differently from the male, as follows: Dorsum of segments 1-6 reddish-yellow, the following markings black: a basal dorsal spot on 1, a hastate spot pointed anteriorly occupying the entire length or nearly so, of 2-4, the point abbreviated on 2 in some; the posterior four-fifths to five-sixths of 5 and three-fourths to four-fifths of 6; or 6 may have but little more than the posterior half black, including a forwardly tapering acute mid-dorsal prolongation. 7 blue, its hindmost half to third black, sending forward three slender branches, one median and shorter, the other two lateral and longer; or the median branch may be wanting and the laterals very short; or only the hindmost fourth of 7 may be black, with no forwardly-directed branches. 8 black, or black with a transverse basal blue ring; or this ring enlarged to occupy the anterior two-fifths of the length of the segment, but interrupted mid-dorsally with black; or 8 blue, with a pair of dorsal black spots occupying the posterior three-fifths. Dorsum of 9 black, with a mid-dorsal blue spot; or blue, with a black stripe on each side as long as the segment, or reaching from the anterior end three-fourths of the way to posterior end. 10 black dorsally, or with a median pale spot, or nearly as described for the male; or blue, with only a slight trace of black on each side at base. Sides of 1-10 reddish-yellow, more red and less yellow on the posterior segments.

*Dimensions*: Abdomen ♂ 18.5-20.5, ♀ 18-20.5; hind wing ♂ 14.5-16, ♀ 15-17 mm.

*Habitat* : — PERU, Puno, November 1–3, 1898, by Wm. J. Gerhard, 14 ♂, 2 homöochromatic ♀, 14 heterochromatic ♀. Academy of Natural Sciences of Philadelphia.

Puno, by Garman, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

BOLIVIA, Chililaya, November 5, 1898, by Wm. J. Gerhard, 8 ♂, 1 homöochromatic ♀, 8 heterochromatic ♀. Academy of Natural Sciences of Philadelphia.

Both of these localities are on Lake Titicaca and therefore at an elevation of 12,500 feet <sup>26</sup> (3711 metres) above the sea, one of the highest altitudes from which Odonata have as yet been reported.

This is the first species of *Amphiagrion* known from South America. It resembles the type of the genus *A. saucium* (Burm.) of North America, not only by positive characters set forth in the most recent limitation of the genus,<sup>27</sup> but also in the variability of the point of origin of  $M_2$  (= nodal sector of de Selys) on the hind wings. Ten males, ten females of *A. titicacæ* from Puno have this origin at the fourth post-nodal in 55 per cent. ♂, 45 per cent. ♀; at the third in 35 per cent. ♂, 50 per cent. ♀; and mid-way between third and fourth in 10 per cent. ♂, 5 per cent. ♀.<sup>28</sup>

*A. titicacæ* differs from *A. saucium* by its less oblique pterostigma, the presence of blue on the posterior abdominal segments, the shape of the abdominal appendages of the male, etc.

#### 108. *Ischnura* ? *nepos* Selys.

(PLATE VI, FIGS. 121, 122.)

*Agrion* ? *nepos* (Bates Mss.) Selys, Bull. Acad. Belg. (2) xli, p. 1249. 1876.

♀ (hitherto unknown); (homöochromatic). Differs from de Selys' description of the male as follows: Pterostigma ochre; blue postocular spots circular; black on the dorsum of abdominal segment 9 divided into two separate or confluent spots, reaching from base to mid-length of the segment; dorsal surface of 10 (which is pale in some) almost carinate medially; appendages shorter than 10, straight, simple, pale or dark; 8 with a well developed vulvar spine; genital valves

<sup>26</sup> Intercontinental Railway Commission quoted by Gannett, Bull. Internat. Bureau Amer. Republ. Sept. 1904, p. 51.

<sup>27</sup> Calvert, Biol. Centr.-Amer. Neurop. p. 102. 1902.

<sup>28</sup> Compare Calvert, *l. c.*, p. 102, footnote †.

reaching to the level of the hind end of 11 (anal tubercle); femora brown superiorly.

In females, which appear to be older, the labrum is black, with only its extreme free margin pale; the postocular spots are indistinct, and the pale narrow antehumeral stripes have disappeared.

♀ (heterochromatic *a*). Upper surface of head and of thorax dull yellowish, with here and there some reddish tinge, especially on the thoracic dorsum; the following black: a narrow stripe along the base of the labrum; a marginal stripe on the nasus, which almost completely surrounds the yellowish disk, except at the middle of the anterior border; a transverse stripe from eye to eye immediately behind the antennæ and enclosing the anterior (median) ocellus and three yellowish or orange points, one in front and one on each side of the ocellus; a second more sinuous transverse stripe from eye to eye just behind the two lateral ocelli; hind surface of the second joint and all of the remaining distal joints of the antennæ; a short line on the upper ends of the humeral and of the second lateral thoracic sutures. The circular blue postocular spots confluent with the pale color of the rear of the head. Apparently a pale green antehumeral line on the reddish-yellow thorax. Abdomen as in the homœochromatic female.

♀ (heterochromatic *b*). Like heterochromatic *a*, but the dorsum of abdominal segment 9 is black, 10 being either black or pale above; in one example there is a posterior brown border to the blue postocular spots.

♀ (heterochromatic *c*). The two transverse stripes on the top of the head fused, leaving only yellowish dots or short lines between them (*i. e.*, between the median and the lateral ocelli); a brown posterior border to the blue postocular spots; a black stripe on each side of the mid-dorsal thoracic carina (which is reddish) half as wide as the mesepisternum on which it lies; an isolated black streak on the mesepimeron close to the humeral suture. (Nearly all the abdomen is lost.)

♂♀. Anal vein (=inferior sector of the triangle of de Selys) separating from the hind margin proximal to the cubito-anal cross-vein (= postcostal nervule of de Selys) on the *front wings* by as much (25 per cent. ♂, 37 per cent. ♀), or by less than as much (75 per cent. ♂, 58 per cent. ♀), as the length of the cross-vein itself; on the *hind wings* separating from the hind margin proximal to the cross-vein by less than the latter's length (17 per cent. ♂, 25 per cent. ♀), or at the cross-vein itself (83 per cent. ♂, 75 per cent. ♀).

Postnodals on the front wings (7-8) ♂, 7-10 (8) ♀ ; on the hind wings 5-7 (6) ♂, 6-7 (7) ♀ ; the numbers in parentheses the most frequent.  $M_2$  (= nodal sector of de Selys) arising nearest the third (75 per cent. ♂, 58 per cent. ♀), midway between the third and fourth (8 per cent. ♂, 21 per cent. ♀), or nearest the fourth (16 per cent. ♂, 21 per cent. ♀) postnodal.

The pterostigma is a most characteristic feature of this species, the costal edge being shorter (100 per cent. ♂♀) than the proximal or distal edges, and often also than the posterior edge ; the distal edge decidedly convex and forming a much less acute angle with the anterior margin of the wing than does the proximal edge.

(All the above percentages based on 6 ♂, 12 ♀.)

*Dimensions* : Abdomen ♂ 16-18, ♀ 16-19.5 ; hind wing ♂ 10.5-11.5, ♀ 11-13.5 mm.

*Habitat* : — BRAZIL, Marajo Island, August-October, 1907, by Miss Harriet Merrill, 1 ♀ and parts of 1 ♂, 1 ♀. Academy of Natural Sciences of Philadelphia.

Cuyabá, 1 ♂, 1 ♀ hom.,<sup>29</sup> 1 ♀ het.<sup>30</sup> *a*, 1 ♀ het. *b* ; Cachoeira 1 ♀ hom., no. 38 ; Cachoeira Cuyabá, flooded campo, January 26, 1 ♂ and parts of 1 ♂, 1 ♀ het. *b*, 1 ♀ het., no. 19 ; id., parts of 1 ♂, 1 ♀ het. *c* ; Chapada, 1 ♀ hom. ? ; Uacaryzal, 1 ♀ hom. and parts of 2 ♀ hom. ; Corumbá, 2 ♂, 1 ♀ hom. ; all by H. H. Smith. Carnegie Museum, Pittsburgh.

BOLIVIA, Piedra Blanca, April, by H. H. Smith, 1 ♂ and part of 1 other specimen. Carnegie Museum, Pittsburgh.

PARAGUAY, Concepcion, by H. H. Smith, part of 1 ♂. Carnegie Museum, Pittsburgh.

In describing this species from a single male, taken by Bates on the Amazon, de Selys remarked : "Si la femelle possédait une épine vulvaire, on pourrait considérer le *nepos* comme un *Ischnura* aberrant. Elle a, en effet, des rapports avec ce groupe, non seulement par sa petite taille et sa coloration, mais encore par la différence du pterostigma aux quatre ailes, les appendices supérieurs branchus à la base, et le bout du 10<sup>e</sup> segment un peu relevé et bituberculé." Now that the existence of a vulvar spine is known, there might be added to the evidence adduced by de Selys in favor of the *Ischnurine* affinities of this species, the apparent existence of dimorphic females.

<sup>29</sup> hom. = homœochromatic.

<sup>30</sup> het. = heterochromatic.

On the other hand it must be pointed out that the difference between the pterostigmata of the front and hind wings of the males is much slighter than in males of *Ischnura* and perhaps than in de Selys' type of *nepos*; in some examples there is no difference in size and very little in shape, and in all there is no difference in color. The shape of the pterostigma is less oblique than in *Ischnura* and is not unlike that of *Acanthagrion truncatum*. The more distally situated point of separation of the anal vein from the hind margin, especially on the hind wings, is a divergence from Ischnurine characters, and so also is the tendency of  $M_2$  in so many hind wings to arise at a point more remote than the third postnodal. The shape of the superior appendages of the male (aside from the existence of the "branche interne") is not Ischnurine, nor on the other hand does it resemble those of the males of de Selys' "seconde section" of *Acanthagrion*, a reference suggested by the venational characters. Further, it is not certain whether the females above described as heterochromatic may not, to some extent, represent different stages in development rather than true dimorphs.

On the whole, however, it seems best to adopt provisionally de Selys' suggestion and consider *nepos* an aberrant *Ischnura*.

The fragmentary specimen from Piedra Blanca shows an interesting abnormality in the stigmata of the hind wings: the stigmata are triangular, due to the meeting of the proximal with the distal edge at the costa and the entire suppression of the costal edge; the stigmata thus touch the costa at hardly more than a point and only a slight recession from the wing margin would be necessary to produce a condition essentially like that of the stigma of the front wing of *Anomalagrion hastatum* ♂.

#### 109. *Ischnura fluviatilis* Selys.

*Ischnura fluviatilis* Ris, Hamburg, Magal. Sammelr. Odon., p. 14, 1904; Deut. Ent. Zeitschr. 1908, p. 518.

*Habitat*: — BRAZIL, Marajo Island, Aug.—Oct., 1907, by Miss H. B. Merrill, 1 ♂, 2 het. ♀; and Rio Grande do Sul, by H. v. Ihering, 2 ♀ no. 333. Academy of Natural Sciences, Philadelphia.

Cachoeira Cuyabá, flooded campo, January 26, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, by W. T. Foster, November, 1899, 1 ♂ (no. 18), 1 ♀ (no. 4), February, 1900, 1 het. ♀. U. S. National Museum.

Villeta, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

ARGENTINA, Santa Helena, east side of Rio Paraná, December 21, 2 ♂, by the same. (Same museum.)

CHILE, Baños de Cauquenes (1 ♂, 1 ♀, U. S. N. M.), Penco (1 ♂) and Concepcione (1 ♀), January, 1905 (Acad. Nat. Sci. Phila.), by C. E. Reed.

109a. *Ischnura fluviatilis* var. *bizonata* Selys.

*Habitat*:—BRAZIL, Uacaryzal, 1 orange ♀; Rio de Janeiro, 2 ♂ and parts of 2 others, 2 orange ♀ and part of 1 other; Rio Grande do Sul, salt marshes, December, 2 ♂, 2 broken ♂, 1 orange ♀; all by H. H. Smith. Carnegie Museum, Pittsburgh.

110. *Anomalagrion hastatum* Say.

*Anomalagrion hastatum*, Calvert, Biol. Centr.-Amer. Neurop., pp. 130, 390. 1903, 1907.

*Habitat*:—BAHAMAS, New Providence, Nassau, June 28, 1904, by Allen, Barbour and Bryant, 1 black ♀. Museum of Comparative Zoölogy, Cambridge, Mass.

PORTO RICO, Mayaguez, by O. W. Barrett, January, 1905, 2 ♂, 2 black ♀, 2 orange ♀. Collection of P. P. Calvert.

111. *Ceratura capreola* Hagen.

*Ceratura capreola* Calvert, Biol. Centr.-Amer. Neurop., pp. 131, 390. 1903, 1907.

*Habitat*:—DUTCH GUIANA, Paramaribo, by Miss K. Mayo, 1 citron ♀.

BRAZIL, Marajo Is., August–October, 1907, by Miss H. B. Merrill, 1 citron ♀.

São Paulo, September 14, 1900, by A. Hempel, 1 black ♀, 1 orange ♀, 1 citron ♀.

All the preceding in the Academy of Natnral Sciences of Philadelphia.

Santa Anna do Japara, August, 1898, by Moenkhaus, 1 citron ♀. Collection of C. C. Adams.

Bom Fim, November 2, 1907, 5 ♂, 1 black ♀, 2 citron ♀, and Barreiras, January 4, 1908, 1 , both in Bahia State; Munez Freire, in Espiritu Santo, June 19, 1908, 1 bl. ♀; Ururahy, June 30, 1908, 1 bl. ♀; all by J. D. Haseman. Carnegie Museum, Pittsburgh.

Rio de Janeiro, November, 4 ♂, 2 ♀; Chapada, 3 ♂ (no. 139); Cuyabá, 2 ♂; Cachoeira, flooded campo, January 26, 2 ♂ (no. 18), 1 citron ♀ (no. 7); Cachoeira, 1 orange ♀ (no. 37); all by H. H. Smith. Carnegie Museum, Pittsburgh.

112. *Palæmnema clementia* Selys.

*Habitat*: — COLOMBIA, Bonda, in Dept. Magdalena, July, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

113. *Peristicta æneoviridis* sp. nov.

(PLATE VI, FIG. 124.)

♂. Head black; labium, a narrow stripe bordering the eyes inferiorly, extreme anterior margin of labrum and rhinarium yellowish; genæ inferiorly pale blue.

Prothorax and thorax *metallic-green*, inferior parts of mesepimeron and of metapleuron and pectus yellow, a very narrow black stripe on the mid-dorsal thoracic carina; hind lobe of prothorax low, its posterior margin convex.

Abdomen dark metallic-green, becoming black on the posterior segments; very small yellowish spot on each side of the base of 4–6. Hind margin of 10 very slightly emarginated mid-dorsally, *not elevated*.

Superior appendages moderately forcipated, twice as thick in the proximal as in the distal half, bearing at mid-length a stout triangular infero-internal tooth not as long as half of the appendage; in profile view the appendages are straight, directed upward, tapering (except for the tooth which is less visible than in dorsal view) from base to apex. Inferior appendages rudimentary.

Legs black; coxæ, trochanters, extreme bases of femora, and upper surfaces of tibiæ yellow; tarsi pale brown. Hairs or spines shorter than the intervals separating them, third femur with 4 (longer) on the outer row, seven (shorter) on the inner row; third tibia with 6 (longer) on the outer, 12 (shorter) on the inner row.

Wings slightly smoky toward the apex; stigma surmounting less than one cell, its distal edge more oblique than the proximal on the front wings. Front wings with 11–12 postnodals;  $Cu_1$  (= superior sector of the triangle of de Selys) terminating  $1\frac{1}{2}$  to 2 cells distal to the vein descending from the nodus;  $M_2$  (= nodal sector) arising at the fourth postnodal;  $M_{1a}$  (= ultra-nodal sector) at the sixth or seventh.

Hind wings with 9-10 postnodals,  $M_2$  arising at the third,  $M_{1a}$  at the sixth,  $Cu_1$  ending  $2\frac{1}{2}$  cells distal to the vein descending from the nodus.

Abdomen 27, hind wing 16 mm.

♀ unknown.

*Habitat*: — PARAGUAY, Sapucay, by W. T. Foster, November, 1899, 1 ♂. United States National Museum.

Differs from the description of the only other known species of the genus, *P. forceps* Hagen, of "Brazil," by the italicised characters.

The sides of the prothorax and of the thorax inferiorly, the coxæ, base of the abdomen, and the superior appendages are slightly pruinose in this male.

114. *Neoneura bilinearis* Selys.

*Habitat*: — BRAZIL, Muniz Freire in Esperitu Santo, June 18, 1908, by J. D. Haseman, 1 ♂. Carnegie Museum, Pittsburgh.

115. *Neoneura fulvicollis* Selys.

*Habitat*: — BRAZIL, Uacaryzal, 1 ♂, and Rio Cuyabá, January 23, 1886, part of 1 ♂, by H. H. Smith. Carnegie Museum, Pittsburgh.

116. *Neoneura rubriventris* Selys.

*Habitat*: — BRAZIL, Rio Grande do Sul, by H. v. Ihering, 2 ♂, no. 331. Academy of Natural Sciences, Philadelphia.

117. *Neoneura sylvatica* Selys.

*Habitat*: — BRAZIL, Rio Salitre, State of Bahia, November 13, 1907, by J. D. Haseman, 1 ♂. Chapada, 1 ♂, no. 184, and Cachoeira, part of 1 ♂ no. 28, by H. H. Smith. Carnegie Museum, Pittsburgh.

118. *Protoneura capilliformis* Selys.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 3 ♂, 1 ♀, nos. 36, 37, 78. Carnegie Museum, Pittsburgh.

119. *Protoneura capillaris* Rambur.

*Habitat*: — JAMAICA, Kingston, by W. J. Fox, 1 ♂. Academy of Natural Sciences, Philadelphia.

120. *Protoneura tenuissima* Selys.

*Habitat*: — BRAZIL, Peixe-Boi, November-December, 1907, by Miss H. B. Merrill, 1 ♀. Academy of Natural Sciences, Philadelphia.



GOMPHINÆ.

121. *Progomphus complicatus* Selys.

*Habitat*: — PARAGUAY, Sapucay, by W. T. Foster, November, 1899, 1 ♂, December, 1899, 4 ♂ no. 41. U. S. National Museum.  
Length of abdomen 33-35.5, hind wing 24-26.5 mm.

122. *Progomphus intricatus* Selys.

(PLATE VII, FIG. 129.)

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 9 ♂ and parts of 4 others, 4 ♂ and part of one other, nos. 137 and 44, 1 ♂ is dated May. Carnegie Museum, Pittsburgh.

See also under the following species:

123. *Progomphus recticarinatus* sp. nov.

(PLATE VII, FIG. 128.)

Closely related to *P. intricatus*; the differences may be seen from the following comparison.

	<i>P. intricatus.</i>	<i>P. recticarinatus.</i>
Occiput:	wider;	narrower.
Superior frontal band:	pale brown;	blackish.
Hind lobe of prothorax:	blackish, rarely yellowish in the middle (♂); yellow margined with black (♂ and 1 ♀);	yellow.
Darker color of thorax:	pale brown;	blackish-brown.
Pale (yellow) ante-humeral stripe:	confluent below with the yellow mesothoracic "collar," almost touching the antealar sinus above;	not confluent with the yellow "collar," not reaching the antealar sinus above.
Yellow "humeral" line (really ante-humeral):	complete;	interrupted near its upper end, which is represented by a spot.
Lateral abdominal markings on 3-7:	brown, not well developed anterior to the median transverse suture of each segment, much paler and and less extended in the ♀;	blackish-brown, well developed anterior to the median suture.

Dorsum of abd. segs. 8 and 9 :	dark-brown not narrowed, or narrowed posteriorly on each ;	dark brown, narrowed posteriorly on each, or not narrowed on 8.
Abdominal segment 10 :	reddish-yellow, only slightly brown at extreme base, or (in 1 ♂) with two brown dorsal stripes for its entire length ;	with a middorsal blackish band from end to end.
Superior appendages in dorsal view :	tapering more gradually to apex, yellowish, no black at base ;	tapering less gradually, greenish, blackish at base.
Do., in profile view :	the external basal denticulated carina distinctly sinuate ;	the same carina almost straight
Branches of the inferior appendage :	yellowish, more strongly curved mesad at tips ;	blackish, less strongly curved at tips.
Apices of the 11th segment (anal tubercle) in dorsal view :	blackish, more acute ;	greenish, less acute.
Abdominal segment 10 (♀), dorsum :	obscure brownish, not quite so dark as those of 8 and 9, almost equal in length to 9 ;	black, half as long as 9.
Appendages ♀ :	longer than 10, subequal to 9, yellowish, tapering to a very acute apex ;	longer than 10, shorter than 9, greenish-yellow, not tapering much except at apex.
Vulvar lamina ♀ :	about one-sixth as long as 9, bilobed almost to base, each lobe wider than long, its apical margin concave, thus forming two angles, of which the ventral-inner one is obtuse and free, while the outer-dorsal one is applied against the ventral surface of 9 ;	about one-fourth as long as 9 but shaped as in <i>intricatus</i> .
Discoidal triangle, front wing :		
3-celled in	19 wings ♂, 9 wings ♀ ;	8 wings ♂.
2-celled in	7 " ♂, 1 wing ♀ ;	2 " ♂.
Internal triangle, front wing :	2 celled in all examples ;	2-celled in all examples.
Discoidal triangle, front wing :		
2-celled in	19 wings ♂, 6 wings ♀ ;	9 wings ♂.
3-celled in	7 " ♂, 4 " ♀ ;	1 wing ♂.

## Internal triangle hind wing :

2-celled in	16 wings ♂, 7 wings ♀ ;	10 wings ♂.
free in	10 " ♂, 2 " ♀ ;	
Length of abdomen in mm.:	31-33 ♂ ;	31.5-33 ♂.
	29-31 ♀ ;	
" " hind wing in mm.:	23-25 ♂ ;	25-26.5 ♂.
	24-25.5 ♀ ;	

## Distance on front wing

from nodus to stigma in  
mm.:

6-7.

7-8.

Both species lack a sternal process on abdominal segment 1 ; both have the pale antehumeral stripes diverging from each other both on their inner and their outer edges.

*Hab. (of recticarinatus)* : BRAZIL, Chapada, by H. H. Smith, 4 ♂ and part of one other, 1 ♀ abdomen attached to a thorax and head of a *P. intricatus* ♀ ; one numbered 69, some dated May and December. Carnegie Museum, Pittsburgh.

*P. recticarinatus* differs from *P. complicatus* by its smaller size, absence of blackish-brown on the face, predominance of yellow on 3-7 in dorsal view, shorter and more strongly curved branches of the inferior appendage ♂ ; it differs from *P. jorgensi* Ris by the absence of black spots at the base and nodus of the wings, and its smaller size.

124. **Gomphoides hesperus**, sp. nov.

(PATE VII, FIGS. 125, 125s.)

♂. Head brown (partly discolored ?) ; external surface of the mandibles greenish-yellow ; superior surface of frons moderately declined ; hind margin of the occiput straight, with blackish hairs.

Thoracic dorsum blackish-brown, a green antehumeral stripe not attaining the antealar sinus, widening forward (cephalad) especially in the foremost third, so that at the anterior mesepisternal margin the stripe is more than twice as wide as at mid-height ; this widening is on the outer (lateral) edge of each stripe, as the inner (mesial) edge is parallel to the mid-dorsal carina and is as far therefrom as the stripe is wide at mid-height ; a second, narrower, green antehumeral stripe is placed just anterior to the humeral suture by less than its own width, it also does not quite reach the antealar sinus. Sides of the thorax chiefly green, a brown stripe on the whole length of the first and of the second lateral sutures ; pectus greenish.

Abdominal segments 1 and 2 chiefly greenish-yellow, with a brown stripe on each side (above the greenish-yellow auricles on 2); 3-10 chiefly blackish-brown, with the following yellow or orange markings: a mid-dorsal line or very narrow stripe on 3-6 and 8-9, but on 7 occupying the whole width of the segment for its anterior two-fifths, narrowing posteriorly on the remaining three-fifths, this mid-dorsal line or stripe almost as long as each segment; a basal spot on each side of 3-6 occupying a third of the segment or less, the sides inferiorly of 7-10, sternites of 8-10. Inferior lateral margins of 8 and 9 enlarged, that of 8 being sinuate in profile view, slightly convex for the first half, then still more slightly concave, becoming more strongly convex and denticulated in the hindmost fourth; that of 9 obtusely angulate (about  $150^{\circ}$ ) at one-third length, remaining two-thirds very slightly concave. 10 in dorsal view constricted in the middle, its posterior margin wider than its anterior and very slightly and widely concave medially.

Superior appendages subequal in length to 10, blackish; in dorsal view nearly straight in the proximal three-fifths, strongly curved toward each other in the remaining two-fifths, each decreasing gradually in width to half its length; apex somewhat obtuse, preceded on the inner side by a distinct parallel finger-like tooth, which falls short of reaching the level of the apex by more than its own length, no other tooth or tubercle on the inner surface of the appendage; in profile view each superior appendage decreases in thickness from base to apex; terminal fourth curved downward; apex moderately acute; an obtusely pointed superior tooth on the upper surface immediately after the base, and a longer, flatter, rounded tubercle on the inferior surface, likewise immediately after the base.

Inferior appendage extremely short, not projecting caudad beyond the level of the posterior dorsal margin of 10.

Coxæ and femora greenish or greenish-yellow; tibiæ and tarsi brownish.

Wings slightly clouded with pale brownish-yellow, especially in the distal three-fifths; stigma ochre; veins, including the costa, brown or black; internal triangle of the hind wings free; the other three triangles two-celled. Front wings with 17-18 antenodals, 10-12 postnodals; and at most two rows of cells in  $Cu_2$  area (= area between the inferior sector of the triangle of Selys and the hind margin). Hind wings with at most three rows of cells in the same area.

Abdomen 39.5, hind wing 30; costal edge of stigma of front wing 3.5 mm.

♀ unknown.

*Habitat*: — ECUADOR, Quevedo, by Prof. F. Campos R., 1 ♂, no. 140 of the collector. Academy of Natural Sciences of Philadelphia.

This species is a *Cyclophylla* of Selys. It falls next to *Gomphoides volsella* Calvert, in the Synopsis of Mexican and Central American species in Biol. Centr. Amer. Neuropt., p. 154. It differs from *volsella* in the shape of the appendages; and in the anterior green antehumeral stripe being narrower, not reaching to the antealar sinus nor confluent with the second or posterior green antehumeral stripe superiorly (as is the case in *volsella*).

125. **Gomphoides viridipleuris** sp. nov.

(PLATE VII, FIGS. 126, 126s.)

♂. Head bluish-green; basal parts of labium, extreme free edges of labrum and of nasus, and external surfaces of mandibles yellow; ocellar area brown; superior surface of frons nearly horizontal, not declined; hind margin of occiput nearly straight, with black hairs.

Prothorax green; hind lobe and some marks on the middle lobe blackish-brown.

Thoracic dorsum rich chocolate-brown, the following yellow: an antehumeral stripe of almost uniform width (.8 mm.) about as far from the mid-dorsal carina as its own width and almost parallel thereto, being only a little nearer to the carina at its upper than its lower end, confluent below with a transverse yellow stripe ("collier mésothoracique"), which latter is interrupted at the lower end of the median carina; a fine green line on all but the upper end of the humeral suture; a slightly wider green line a short distance in front of, and parallel to, the humeral suture for the whole height of the sclerite.

Anterior edge of the mesepimeron with a brown line or narrow stripe about equal in width to the brown, which separates the just-mentioned humeral and antehumeral lines, but *all the remainder of the mesepimeron and all the metapleuron yellowish-green, without darker markings of any kind.* Pectus yellowish.

Abdominal segments 2-7 greenish-yellow mid-dorsally for the entire length of each segment, except at the intersegmental articulations, but narrowing posteriorly on each (in some to a mere line); sides superiorly blackish-brown behind the greenish auricles on 2, for the

whole length of 3, and for nearly the whole length of 4-7, excepting for the basal tenth of each; this brown widens posteriorly on each segment reaching up on the dorsum, but is not confluent with the brown of the opposite side, except at the intersegmental articulations. 8-10 similarly marked, but the mid-dorsal yellow is narrower, and may not reach to the hind end of each. Sides of all the abdominal segments inferiorly and the sternites of 8-10 yellow; sternites of 3-7 blackish. Inferior lateral margins of 8 and 9 enlarged; that of 8 convex, especially near the posterior end, and denticulated; that of 9 hardly convex, almost straight, not denticulated. Hind margin of 10 convex and entire medially, its inferior lateral angle on each side with a tuft of brownish-yellow hairs and folded under and applied against the sternite. In dorsal view 10 is constricted at mid-length, its hind end wider than its front end.

Superior appendages longer than 10, subequal to 9, brownish at base, blackish at apex, yellowish within. In dorsal view each appendage is almost straight for its proximal two-thirds, but decreases gradually in width, especially on the inner side; distal third strongly curved inward (mesad); apex rounded, and preceded on its inner side by a distinct finger-like process, which falls short of reaching the level of the apex by more than its own length; at about half length the inner surface bears a small blunt tubercle nearer the upper edge of the appendage. In profile view each superior appendage is nearly straight in its proximal two-thirds, curved rather strongly down in its distal third; apex moderately acute; in the proximal fourth the appendage decreases greatly in thickness, especially on its upper surface, while the lower surface bears a well-marked rounded tubercle.

Inferior appendage very short, not reaching to more than the level of one-tenth of the superiors.

Legs greenish-yellow; a supero-external femoral stripe; most of the tibiae (except their proximal superior portions) and the tarsi black.

Wings slightly clouded with obscure yellowish; stigma pale ochre; costa yellow anteriorly; other larger veins brownish; internal triangle of hind wing free; the other three triangles two-celled (3-celled in the discoidal triangle of one front wing); front wings with 16-19 antenodals, 9-12 postnodals; at most three rows of cells between  $Cu_2$  (= inferior sector of the triangle of de Selys) and the hind margin. Hind wings with 4-5 rows in the same area.

Abdomen 37-38; hind wing 28-29 mm.

♀ unknown.

*Habitat*:—PARAGUAY, Sapucay, December, 1899, W. T. Foster, 3 ♂. United States National Museum.

This species would be referred to *Cyclophylla* in the Selysian classification; it differs from the previously described species in its combination of immaculate green sides of the thorax with superior appendages of the shape here given. It falls under rubric B of the synopsis of Mexican and Central American species of *Gomphoides* in Biol. Centr.-Amer. Neurop., p. 153.

#### 126. *Gomphoides dentata* Selys.

*Aphylla dentata* Ris, Hamburg. Magal. Sammelr. Odon., p. 16. 1904.

PARAGUAY, Rio Paraguay below Asuncion, Dec. 24, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

Rio Paraguay below Concepcion, Dec. 30, by H. H. Smith, part of 1 ♂. Carnegie Museum, Pittsburgh.

These specimens measure: abdomen 45, hind wing 34–35 mm.

The published descriptions do not mention that the hind dorsal margin of abd. seg. 10 has a small median semicircular notch, the diameter of which is about one-half of that of either superior appendage at base.

The male of December 30 has the green antehumeral stripes confluent below for the inner (mesial) half of the width of each, with the green “collier mésothoracique.”

#### 127. *Gomphoides camposi* sp. nov.

(PLATE VII, FIG. 127.)

♂. Head brown; frons superiorly, mandibles externally, labium, some indistinct marks on the rear of the head, and occiput green. Superior surface of frons, viewed from in front, concave medially for a depth equal to the diameter of the median ocellus. Hind margin of the occiput slightly convex, with long black hairs.

Prothorax brown; thoracic dorsum darker brown; a greenish-yellow antehumeral stripe (about 8 mm. wide at mid-height) widening anteriorly, where it is confluent with a transverse anterior mesothoracic stripe, (“collier mésothoracique”), this latter interrupted at the lower end of the mid-dorsal carina; the antehumeral stripe not quite reaching the antealar sinus above, diverging slightly from above downward

(forward) from the mid-dorsal carina, from which it is distant by about its own width. No second pale antehumeral or pale humeral stripe. A pale green stripe about mid-way between the humeral and obsolete first lateral sutures, narrower than the brown areas, which precede or follow it. A green stripe, narrowing upward and interrupted before it reaches the superior metapleural margin, just in front of the second lateral suture. The larger (posterior) part of the metepimeron and all of the pectus greenish-yellow.

Abdominal segment 1 greenish-yellow, dorsum brownish; 2 greenish-yellow below, and, including the auricles, brown above, with a narrow median yellow stripe; 3-10 blackish; the following yellow: basal fourth and a confluent mid-dorsal stripe, narrowing posteriorly and reaching to the posterior transverse row of denticles of 3; basal eighth of 4-6; basal two-fifths of 7; an indistinct basal mid-dorsal spot on 8; inter-articular membrane between 9 and 10. Inferior lateral margins of 8 and 9 enlarged, that of 9 strongly convex, the maximum of the enlargement at five-sixth of the segment's length and equal to half of the height of the segment at base; that of 9 regularly convex and most enlarged at mid-length of the segment. Segment 10 in dorsal view slightly constricted in the middle, its entire and almost straight posterior margin a little wider than its anterior; in profile view its hind end longer (higher) than its front end, its lower surface three-fifths as long as its dorsal surface.

Superior appendages 2.5 mm. long, more than twice as long as 10, longer than 9, subequal to 8, blackish at base, yellow at apex, curved toward each other in the distal third, decreasing in width and thickness from base to apex, armed with teeth and spines as follows: a small acute inferior tooth at one-sixth length, a long strong acute inferior spine directed downward, caudad, and inward at two-fifths length, a stout rather obtuse superior tooth or tubercle directed upward and inward at two-thirds length; the extreme acute apex is bent upward almost at right angles, the angle coinciding with the end of an inner thickening of the appendage homologous to the finger-like process of other species.

Inferior appendage black, divided shortly beyond its base into two slender branches, which are as distant from each other as are the two superior appendages at their bases, each branch curved upward and slightly outward, and reaching caudad as far as the level of the base of the stout inferior spine of the superiors.

Coxæ and femora greenish, tibiæ and tarsi black.



Wings yellow at the extreme base not as far as to the basal subcostal cross-vein; stigma blackish-brown; costa yellow anteriorly, other veins black or brown; internal triangle of hind wings free, the other three triangles 2-celled. Front wings with 20-22 antenodals, 13-14 postnodals; at most three rows of cells between  $Cu_2$  and the hind margin. Hind wings with at most four rows of cells in the same area.

Abdomen 43, hind wing 32, costal edge of stigma of front wing 3.7 mm.

♀ unknown.

*Habitat*: — ECUADOR, Quevedo, by Prof. F. Campos R., 1 ♂, numbered 86 by the collector. Academy of Natural Sciences of Philadelphia.

This species, named in honor of the savant who has communicated the type specimen, and who has undertaken the preparation of a Catalogue of Ecuadorian Odonata, is perhaps related more nearly to *G. ? annectens* Selys than to any other known species. *Annectens* is a larger species, with 3-celled discoidal triangles on all the wings, a longer pterostigma, and differently shaped superior appendages, the latter having a strong triangular tooth, apparently replacing the stout inferior spine of *camposi*, and the details at the apex are different.

*G. camposi* will fall under rubric F with *G. suasa* in the synopsis of Mexican and Central American species in Biol. Centr.-Amer. Neuropt., p. 154.

#### 128. *Neogomphus molestus* Selys.

*Habitat*: — CHILE, Baños de Cauquenes, by E. C. Reed, 1 ♂. United States National Museum.

#### ÆSHNINÆ.<sup>31</sup>

#### 129. *Anax longipes* Hagen.

*Anax longipes* Calv., Biol. Centr.-Amer. Neurop., p. 176.

*Habitat*: — BAHAMAS, Eleuthera Is., April 11-21, 1897, by C. J. Maynard, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

#### 130. *Æshna bonariensis* Rambur.

*Æshna bonariensis* Ris, Hamburg. Magal. Sammelr. Odon., pp. 24, 25. 1904; Deut. Ent. Zeitschr., 1908, pp. 523, 525.

*Habitat*: — BRAZIL, Sete Lagoas, in Minas Geraes, May 3, 1908, by J. D. Haseman, 1 ♂. Carnegie Museum, Pittsburgh.

<sup>31</sup> In view of the appearance of the first installment of M. Rene Martin's "Æschnines," of the Selys Catalogue, I have included here only the Æshninæ of the Carnegie Museum, reserving all others for future study.

131. *Æshna haarupi*? Ris.

*Æshna haarupi* Ris, Deut. Ent. Zeitschr., 1908, p. 523.

*Habitat*: — BRAZIL, Rio de Janeiro, November, by H. H. Smith, 1 ♀. Carnegie Museum, Pittsburgh.

Agrees fairly well with Dr. Ris' description, but has the T-spot of the frons like that of *Æ. confusa* Ramb.; hind wing 43 mm., appendages lost.

132. *Æshna ingens* Rambur.

*Æshna ingens* Calvert, Biol. Centr.-Amer. Neurop. p. 187. 1905.

*Habitat*: — BAHAMAS, Berry Is., April 7, 1891, 1 ♂, and Great Harbor Cay, April 3, 1891, 1 ♂, by C. B. Cory. Museum of Comparative Zoölogy, Cambridge, Mass.

133. *Æshna adnexa* Hagen.

*Æshna adnexa* Calvert, Biol. Centr.-Amer. Neurop., p. 188. 1905.

*Habitat*: — COLOMBIA, Bonda, by H. H. Smith, 1 ♀. Carnegie Museum.

134. *Gynacantha septima* Selys.

*Gynacantha septima* Calvert, Biol. Centr.-Amer. Neurop., p. 191. 1905.

*Habitat*: — COLOMBIA, Bonda, by H. H. Smith, 2 ♂, 1 ♀. Carnegie Museum.

135. *Gynacantha nervosa* Rambur.

*Gynacantha nervosa* Calvert, Biol. Centr.-Amer. Neurop., p. 193. 1905.

*Habitat*: — COLOMBIA, Bonda, 2 ♀, and Don Diego, 1 ♂, by H. H. Smith. Carnegie Museum.

## CORDULINÆ.

136. *Gomphomacromia paradoxa* Brauer.

*Gomphomacromia paradoxa* Needham, Proc. U. S. Nat. Mus. xxvi, pl. 43, fig. 1, p. 722, fig. 17<sup>4</sup>. 1903. Ris, Hamburg. Magal. Sammelr. Odon. p. 30. 1904. Martin, Selys Coll. Cordulin., p. 56, figs. 60, 73, pl. II, fig. 9. 1906.

*Habitat*: — CHILE, Banos de Cauquenes, by E. C. Reed, 1 ♂, 1 ♀. PATAGONIA, Latitude Cove, 1 ♀, from the U. S. Fish Commission. All three specimens in the U. S. National Museum.

137. *Neocordulia volxemi*.

(PLATE VII, FIGS. 132, 133).

*Gomphomacromia volxemi* Selys, Bull. Acad. Belg. (2) xxxvii, p. 21. 1874.

Martin, Coll. Zoöl. Selys Cordulin. p. 55, fig. 72 (venation). 1906.

*Neocordulia volxemi* Selys, Compt. Rend. Soc. Ent. Belg. 1882, p. clxix.

Kirby, Cat. Odon. p. 53. 1890.

This species has hitherto been known only from the female sex. M. Martin has again referred it to *Gomphomacromia* after de Selys had removed it to the more lately established *Neocordulia*. M. Martin remarks, *l. c.*, "Cette espèce forme le passage entre les *Neocordulia* et les *Gomphomacromia*: si on tient compte de l'écaille vulvaire courte, elle devrait être classée avec les *Neocordulia*; si, au contraire, on remarque qu'elle n'a, après un rang de 2 ou 3 cellules d'abord, qu'un seul rang de posttriangulaires, sa place est avec les *Gomphomacromia*." Yet the figure accompanying M. Martin's text, fig. 72, shows two rows of posttriangular cells from triangle almost to the hind margin of the front wings and for five cells beyond the triangle on the hind wings, when the number of rows increases—in no place a single row. De Selys also gives no hint that *volxemi* has other than "deux rangs posttriangulaires" (*l. c.* 1882). There seems to be no reason, therefore, so far as the posttriangular rows are concerned, for excluding *volxemi* from *Neocordulia*.<sup>32</sup>

♀. Two females from Chapada in the Museum of Comparative Zoölogy agree quite well with de Selys' description and M. Martin's figure, except that the abdominal appendages are longer than 10, more than half as long as 9. The vulvar lamina, the length of which is not given by the preceding authors, reaches to the level of one-third the length of the sternite of 9, which latter bears two small style-like processes at the level of the tip of the vulvar lamina.

♂. Two males in the same Museum, one labeled Chapada, December, the other simply "Brazil," are very probably of this species. They have the face and lips greenish-yellow, becoming brownish, with some metallic-blue reflection on the anterior surface of the frons and on the vertex. Occiput dull pale brown or yellow.

Thorax brilliant metallic-green, the sutures and most of the ventral surface pale brown.

<sup>32</sup> An error which has crept into Prof. Needham's work "A Genealogic Study of Dragon-fly Wing Venation" (Proc. U. S. Nat. Mus. xxvi, pp. 703-764. 1903) may also be corrected here. Fig. 1, pl. xlii, given as the wings of *Neocordulia androgynis*, is not that of a *Neocordulia* at all, but of something close to *Dorocordulia*.

Abdomen dark brown with the following pale brown or yellow markings: a spot on each side near the hind end of 2; a narrow transverse stripe on the median suture of 3-6, between which and the anterior end of each of these segments the mid-dorsal surface is indefinitely paler; a triangular mid-dorsal spot on 7-9, reaching from the anterior end to more than half of the length of each segment; a spot on each side of 10.

Abdomen somewhat compressed in 1-2, narrower and more slender in 3-6, widened from the anterior end of 7 to the hind end of 8, thence narrowing. Ventral surface of 8 just anterior to mid-length with a stout process, *not half as long as 8*, which is bifid at tip; apices acute.

Superior appendages twice as long as 10, a little longer than 9, yellowish at base, brown at apex, in dorsal view *almost straight*, their inner margins diverging, their outer margins *almost parallel or diverging moderately*, inner-upper surface of each at two-fifths' length *with a moderate and rather obtuse tooth*, outer surface at three-fourths' length *with a smaller tubercle*, inferior surface at one-fifth length with a still smaller but acute tooth, apex of the appendage blunt, distal half with many long hairs, chiefly on the inner side.

Inferior appendage yellowish, reaching to the level of three-fourths of the length of the superiors; in ventral view with a truncated apex, half as wide as the base, and terminating in two upturned denticles.

Genital hamule yellow, almost as prominent as the genital lobe, bifid at apex, branches transverse, outer branch longer, strongly hooked, directed mesad. Genital lobe yellow, rather densely covered, chiefly on its mesial side, with dark hairs.

Wings slightly smoky or dirty yellowish.

Abdomen 38-40, hind wing 35; costal edge of stigma of front wing 2.5 mm.

These males much resemble those of *N. androgynis* Selys, but differ therefrom in the appendages, the differences from de Selys' description and M. Martin's figure 69 (of the appendages of *androgynis*) being indicated in the above description by italics.

The female of *N. volxemi* appears to differ from that of *N. androgynis* chiefly by its larger size (abdomen 38-39 *vs.* 37, hind wing 38 *vs.* 34 mm.)

138. *Dorocordulia errans* sp. nov.

(PLATE VII, FIG. 131.)

♂. Head lost (replaced by that of some Libelluline).

Thorax metallic-green with some pale brown on the sutures and on the pectus.

Abdomen in dorsal view narrowing very gradually from 2 (2.2 mm.) to the base of 5 (1.2 mm.), thence widening to the base of 8 (3 mm.), thence narrowing to the hind end of 10 (1.2 mm.); segment 1 pale brown, dorsum of 2-8 metallic-green, bordered on each side with orange for the entire length of each segment above the lateral carina; 9 similar, except that black replaces the metallic-green, 10 black, with a small orange spot on each side at its hind end, and a low mid-dorsal carina. Ventral side of 3-10 blackish, the extreme inferior edges of the tergites, where they underlap the sternites, yellowish.

Superior appendages not quite as long as 9 + 10, dark brown, subcylindrical, slightly enlarged in the proximal fourth and in the distal third chiefly on the outer and lower surfaces, *apex rounded, not at all acute*, lower surface bordered externally with a carina, which at the extreme base forms a slight convexity, *no other teeth or tubercles*.

Inferior appendage almost as long as the superiors, blackish, triangular when viewed from below, much attenuated in the distal third; apex one-fourth as wide as base, barely excised, slightly upcurved.

Wings very faintly yellowish, this color best seen in the anal triangle; stigma brown (its costal edge 2 mm. long), many of the veins in the proximal half of the wing pale brown or yellow, darker in the distal half and near the hind margin. Venation very similar to that shown in Plate XLII, fig. 1,<sup>33</sup> Proc. U. S. Nat. Mus., vol. xxvi, by Prof. Needham, even to the anal loop, but differing in that the front wings have the internal triangle divided into two cells by a perpendicular vein and two rows of posttriangular cells not interrupted by three cells just proximal to the level of the nodus. The agreement with this figure is indeed better than with that of *D. libera* given by M. Martin (Coll. Zoöl. Selys, Cordulin. p. 35, fig. 39). We may add that the front wings have 7-8 antenodals, 6 postnodals; the hind wings 5 antenodals, 7-8 postnodals.

<sup>33</sup> This is the figure, erroneously labeled as *Neocardulia androgynis* in the explanation of that plate, to which attention is called in the footnote to page 223 of the present memoir.

Abdomen 30, hind wing 29 mm.

♀ unknown.

*Habitat*: — BRAZIL, Chapada, presumably by H. H. Smith, 1 ♂ numbered 8. Museum of Comparative Zoölogy, Cambridge, Mass.

This specimen was once examined by Prof. Needham, as it bears a label in his handwriting "Near *Somatochlora libera* Selys," an opinion with which I thoroughly agree. It differs from *libera* and also *lepida* Selys in the shape of the superior appendages, as indicated by the italicized portions of the above description.

It is surprising, however, to find what appears to be a *Dorocordulia* in southern Brazil, as the genus has not hitherto been known south of Maryland. There is, therefore, ground for suspecting that the locality-label may have been misplaced, but in any event the species appears to be undescribed previously.

### 139. *Somatochlora villosa* Rambur.

*Somatochlora villosa* Ris, Hamburg. Magal. Sammelr. Odon., p. 29. 1904. Martin, Coll. Selys, Cordulin., p. 20, fig. 15. 1906.

*Habitat*: — CHILE, Baños de Cauquenes, 1 ♂; Valparaiso, 1 ♀; E. C. Reed. U. S. National Museum.

## LIBELLULINÆ.

### 140. *Libellula herculea* Karsch.

*Libellula herculea* Calvert, Biol. Centr.-Amer. Neurop. p. 209, 1905.

*Habitat*: — COLOMBIA, Don Amo and Minca, by H. H. Smith, each 1 ♂ in July. Carnegie Museum, Pittsburgh.

VENEZUELA, San Julian, July 20, 1900, by M. W. Lyon, Jr., 1 ♂, 1 ♀. U. S. National Museum.

PARAGUAY, Sapucay, by W. T. Foster, December, 1899, to March, 1900, 4 ♂, 1 ♀. U. S. National Museum.

Some comparative data for the Sapucay males are given in the 'Biologia' volume quoted above.

### 141. *Zenithoptera americana* Linnæus.

*Habitat*: — BRAZIL, Galhaõ, February 7, 1908, part of 1 ♀; Rio Sapon, January 30, 1908, 1 ♀; by J. D. Haseman.

Ucaryzal, February, by H. H. Smith, part of 1 ♂. Carnegie Museum, Pittsburgh.

142. *Ephidatia longipes* Hagen.*Ephidatia longipes* Calvert, Biol. Centr.-Amer. Neurop. p. 216. 1906.*Habitat*:—BRAZIL, Sete Lagoas in Minas Geraes, May 4, 1908, by J. D. Haseman, 1 ♀. Carnegie Museum, Pittsburgh.143. *Ephidatia longipes cubensis* Calvert.*Ephidatia longipes cubensis* Calvert, l. c., p. 216. 1906.*Habitat*:—BAHAMAS, New Providence Is., vicinity of Nassau, June 28–July 1, 1904, by Allen, Barbour, and Bryant, 1 ♀. Museum of Comparative Zoölogy, Cambridge, Mass.

## Genus URACIS Rambur.

Calvert, Biol. Centr.-Amer. Neurop. pp. 199, 217. 1905, 1906.

The species of this genus known to me may be distinguished as follows:

- A. Hind wing with the discoidal triangle free, four cubito-anal cross-veins, one post-triangular row increasing to two at, or a little distal to, the level of separation of  $M_{1+2}$  (= principal sector of de Selys) from  $M_3$  (= median sector); front wing with two cubito-anal cross-veins, three posttriangular cells followed by two rows increasing to three rows between the levels of separation of  $M_{1+2}$  from the bridge and of the nodus; no supra-triangular cross-veins on any wing.
- B. Hind wing with two rows of cells between  $A_3$  and the hind margin at the level of the hind angle of the triangle; wings uncolored; size smaller: abd. ♂ 23, hind wing ♂ 27, ♀?.....*siemensii*.
- BB. Hind wings with three rows of cells between  $A_3$  and the hind margin at the level of the hind angle of the triangle; wings (of the ♀ at least) brown at tips into the level of the distal end of stigma or nearly so, ovipositor extremely long (3.7 mm. from the hind ventral margin of 8), projecting 3 mm. beyond the hind end of the abdomen; size larger: abd. ♀ (excl. ovip.) 23.5–25.5, hind wing ♀ 33–35, ♂? *ovipositriv.*
- AA. Hind wing with the discoidal triangle cross-veined.
- C. Hind wing with one posttriangular row, two cells between  $A_3$  and the anal margin; front wings with not more than two posttriangular rows to the level of the nodus; a supratrangular cross-vein and 4–6 cubito-anal cross-veins present on all wings.
- D. Wings uncolored; abd. ♂ 26, ♀ 24–25; hind wing ♂ 31.5, ♀ 27.5–30 mm. ....*ovata*.
- DD. Wings with a transverse brown band from nodus to proximal end of stigma; abd. ♂ 25, hind wing ♂ 30 mm. ♀?.....*infumata*.
- CC. Hind wing with two posttriangular rows, 3–4 cells between  $A_3$  and the anal

margin; front wings with three posttriangular rows for at least part of the way to the level of the nodus; tips to distal halves of all wings brown.

- E. Supratrangular cross-veins absent on the front wings, often also on the hind; front wings with 1-3 cubito-anal cross-veins; vulvar lamina projecting 1 mm. or less beyond the hind end of the abdomen; abdomen ♂ 21-24, ♀ 22-23; hind wing ♂ 25-28, ♀ 25-28.5 mm.

*imbuta*.

- EE. Supratrangular cross-veins present on all the wings; front wings with 4-6 cubito-anal cross-veins; vulvar lamina projecting 2 mm. beyond the hind end of the abdomen; abdomen ♂ 25-30, ♀ 23.5; hind wing ♂ 31-35, ♀ 29-33 mm. .... *fastigiata*.

144. **Uracis siemensii** Kirby.

*Uracis siemensii* Kirby, Ann. Mag. Nat. Hist. (6), xix, p. 605, pl. xii, fig. 3. 1897.

*Habitat*: — BRAZIL, Para Thayer Expedition, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

145. **Uracis ovipositrix** sp. nov.

(PLATE IX, FIG. 145.)

(Description in the preceding synopsis.)

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 3 ♀, part of 1 other and of 1 specimen, some numbered 171 by the collector. Carnegie Museum, Pittsburgh.

146. **Uracis ovata** sp. nov.

(Description in the preceding synopsis.)

*Habitat*: — BRAZIL, 1 ♀ without further locality, Bahia, 1 ♂, 1 ♀; 1 ♀ without locality-label. Museum of Comparative Zoölogy, Cambridge, Mass.

147. **Uracis infumata** Rambur.

*Habitat*: — BRAZIL, 1 ♂ with no further locality, Bahia 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

148. **Uracis imbuta** Burmeister.

*Uracis imbuta* Calvert, Biol. Centr.-Amer. Neurop. pp. 218, 402, pl. ix, fig. 6. 1906, 1907.

*Habitat*: — COLOMBIA, Bonda, October, 1 ♂.

BRAZIL, Para, August, 1 ♂; Chapada, 10 ♂, 6 ♀.

All by H. H. Smith, Carnegie Museum, Pittsburgh.



149. *Uracis fastigiata* Burmeister.

*Uracis fastigiata* Calvert, Biol. Centr.-Amer. Neurop. pp. 219, 402, pl. ix, figs. 7, 8. 1906, 1907.

*Habitat*: — COLOMBIA, Don Diego, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

150. *Tholymis citrina* Hagen.

*Tholymis citrina* Calvert, Biol. Centr.-Amer. Neurop. p. 220, pl. ix, figs. 9-11. 1906.

*Habitat*: — COLOMBIA, Bonda, by H. H. Smith, 2 ♂, 1 ♀. Carnegie Museum, Pittsburgh.

MICRATHYRIA.

The following, modeled after the less extensive but more detailed synopsis of the Mexican and Central American species, in the *Biologia Centrali-Americana*, Neuroptera, pages 221-223, shows the gradual reduction (or, if preferred, and the table be read backward, the gradual increase) in density of the venation. It does not pretend to include all of the known South American species, but only those treated in this paper. As was pointed out in the work cited, these venational characters are subject to more, (*e. g.*, *M. didyma hypodidyma*), or less variation, so that specific identifications can not be based on them alone; but reference should always be made to the structure of the genitalia and abdominal appendages of the males, and the vulvar lamina and gonapophyses of segment 9 of the females. On resemblances in these structures have been erected the subspecies of *M. didyma* and of *M. ocellata*, in spite of the venational differences.

*Synopsis of Venational Characters of some South American Species.*<sup>34</sup>

- A. Number of cells between the hind angle of the triangle and vein  $A_2$  immediately opposite that angle on the hind wing *two*.
- A. 1. Internal triangle of the front wing 3-celled.
- B. Discoidal triangle of the front wing 2-celled.
- C. Posttriangular field of the hind wing with no single cell reaching from  $M_4$  (= short sector of de Selys) to  $Cu_1$  (= upper sector of the triangle)...*didyma*, some *didyma hypodidyma*, *dythemoides*.
- CC. Posttriangular field of the hind wing with at least one cell reaching from  $M_4$  to  $C_1$ .....*atra*.
- BB. Discoidal triangle of the front wing free.

<sup>34</sup>The letters preceding certain rubrics, as A, B, C, etc., are employed to indicate similar rubrics in the table in the *Biologia*.

- BB. 1. Posttriangular field of the hind wing with no single cell reaching from  $M_4$  to  $Cu_1$ .....Most *didyma hypodidyma*, *spinifera*.
- BB. 2. Posttriangular field of the hind wing with at least one cell reaching from  $M_4$  to  $Cu_1$ . .....*ocellata*.
- A. 2. Internal triangle of the front wing 2-celled; discoidal triangle of the front wing free.
- Posttriangular field of the hind wing with no single cell reaching from  $M_4$  to  $Cu_1$  .....*didyma laevigata*.
- Posttriangular field of the hind wing with at least one cell reaching from  $M_4$  to  $Cu_1$  .....*ocellata dentiens*.
- A. 3. Internal and discoidal triangles of the front wing free, posttriangular field of the hind wing with at least one wing reaching from  $M_4$  to  $Cu_1$ ....*catenata*.
- AA. Number of cells between the hind angle of the triangle and vein  $A_2$  immediately opposite that angle on the hind wing *one*; at least one cell reaching from  $M_4$  to  $Cu_1$  on the same wing.
- Discoidal triangle of the front wing 2-celled, internal triangle 3-celled. *athenais*.
- Discoidal triangle of the front wing free.
- E. Internal triangle of the front wing 3-celled.
- [*schumanni* of Mexico & Central America].
- EE. Internal triangle of the front wing 2-celled.....*longifasciata*.
- EE. Internal triangle of the front wing free.
- The two posttriangular rows of the front wing increase to three at the level of the first postnodal.....*macroceris*.
- The two posttriangular rows of the front wing increase to three distal to the level of the first postnodal.. .....*tibialis*, *eximia*.

### 151. *Micrathyria didyma hypodidyma* Calvert.

*Micrathyria didyma hypodidyma* Calvert, Biol. Centr.-Amer. Neurop. p. 224, footnote. 1906.

*Micrathyria protea* Förster, Entomologisches Wochenblatt, xxiv, p. 153, 167. 1907.

The following additional material is at hand.

*Habitat*:—BRAZIL, Rio Grande do Sul, 2 ♂, 1 ♀. Rio de Janeiro, January, 2 ♂ and part of 1 ♂, November part of 1 ♂, undated 2 ♂ and part of 1 ♂, 1 ♀; H. H. Smith. Muniz Freire, Espiritu Santo, June 19, 1908, 1 ♂; J. D. Haseman.

PARAGUAY, Rio Parana, below Rosario, December 18, 1 ♀; H. H. Smith. All in the Carnegie Museum, Pittsburgh.

These specimens show considerable variation in the venation. There is only one cell between the hind angle of the triangle and  $A_2$  immediately opposite that angle in both hind wings of 1 ♂ R. G. do Sul, and in one hind wing of 1 ♂ of R. d. Janeiro. The internal triangle of the front wings is two-celled in one wing each of 1 ♂ R.

G. d. Sul and 1 ♂ R. d. Janeiro. The discoidal triangle of the front wings is free in both wings of 1 ♂ R. G. d. Sul and one wing female R. G. d. Sul; both wings of 6 ♂, 1 ♀ and one wing of 1 ♂ R. d. Janeiro; both wings of 1 ♀ R. Parana; or 20 front wings out of 26, the remaining 6 having this triangle two-celled. There is at least one single cell reaching from  $M_4$  to  $C_1$  on one hind wing each of 1 ♂ R. G. d. Sul and of 1 ♀ R. Parana.

152. *Micrathyria didyma laevigata* subsp. nov.

♂. Agrees with *didyma* type in size and in the absence of pointed tubercles on the ventral surface of abdominal segment 1. Agrees with *didyma hypodidyma* in having "the brown stripes on the first and second lateral thoracic sutures so widened that their adjacent edges coalesce almost completely, thus forming one . . . brown stripe," 1 mm. wide, "enclosing a green vitta inferiorly," the external or anterior hamular branch "extending forward only to the level of (and not anterior to) the front edge of the anterior lamina." The superior appendages are intermediate between those of *didyma* type and *didyma hypodidyma*, being less robust than those of the first, more robust than those of the second, as well as being intermediate in the tendency to form a tooth at the last inferior denticle. There is also the venational difference stated in the table at the head of the genus in this paper.

Front wings with 12 antenodals, 9-10 postnodals, two posttriangular rows increasing to three at the level of the penultimate antenodal. Hind wings with 8-9 antenodals, 9-10 postnodals, two posttriangular rows increasing to three at the level of the separation of  $M_3$ .

♀. Here I also place individuals from Corumbá, in spite of the very different locality from which they come, because they agree with the preceding male in the color character stated, and in the venational characters of the table at the head of this genus, page 229, as well as with the structural female characters of *didyma*.

Front wings with 10-12 (11) antenodals, 7-9 (8) postnodals; hind wings with 8-9 (8) antenodals, 7-9 (8) postnodals. Posttriangular rows as above stated for the male, although the point of increase from two to three rows varies slightly. The only variation from the venational characters of the table of page 229 is that one female has the internal triangle of the left front wing three-celled instead of two-celled.

*Dimensions*: Abdomen ♂ 24.5, ♀ 21; hind wing ♂ 29, ♀ 27-29; costal edge of stigma, front wing, ♂ 2.5, ♀ 2.5-2.8 mm.

*Habitat*: — COLOMBIA, Don Diego in Department of Magdalena.

BRAZIL, Corumbá, in Matto Grosso, May, one female and parts of four others.

All the specimens collected by H. H. Smith, and in the Carnegie Museum, Pittsburgh.

153. ***Micrathyria dythemoides*** sp. nov.

(PLATE VII, FIG. 135.)

♂. Face and lips pale greenish-yellow, lateral labial lobes with a mesial (inner) black margin, one-sixth as wide as the lobe itself, and a narrower anterior black margin; free edge of labrum narrowly black; frons superiorly and vertex metallic-blue; occiput brown above, pale green behind, with a median vertical brown line; rear of head blackish-brown with two yellowish spots behind each eye-margin.

Hind lobe of prothorax slightly, but distinctly, bilobed in dorsal view.

Thoracic dorsum brown, a narrow yellowish antehumeral stripe on each side, distant at its upper end (which does not reach a transverse yellow stripe in front of the antealar sinus) from its fellow of the opposite side by 1.5 mm., and at its lower end by 2.5 mm.; the above-mentioned transverse yellow stripe confluent at its outer (lateral) end with a slightly wider complete sinuous yellow humeral stripe. Sides of the thorax predominantly greenish-yellow with three brown stripes, decreasing in width from before backward, the first bordering the humeral suture posteriorly, the second on the obsolete first lateral suture, the third on the second lateral suture; none of these three brown stripes forked, or anastomosing with each other.

Abdomen predominantly brown, becoming darker posteriorly; the following greenish-yellow: most of 1 and 2; a longitudinal stripe on each side of the dorsum of 3-7, reaching from the anterior end of each to nearly the entire length of 3; half of 4, one-third of 5 and less of 6 and two-thirds of 7, less than half as wide as the side of the dorsum on which it lies on 3-6 but on 7 so widened as to cover three-fourths of the width and to be separated from its fellow of the opposite side by the mid-dorsal carina only.

Superior appendages broken, brown. Inferior appendage slightly longer than 9 + 10 (= 1.6 mm.), triangular, its apex one-fifth as wide as its base.

Anterior lamina deeply bilobed, lobes separated by an interval more than half as wide as each lobe, apices not widened, truncate, almost smooth, equally as prominent as the inner branch of the two-branched hamule. Inner (posterior) branch of this latter, acute, terminating in a hook directed caudad and laterad; outer (anterior) branch apparently more prominent, badly damaged. Genital lobe less prominent than the other two parts, wider than long.

Legs blackish-brown, first femora green inferiorly.

Wings clear, venation dark brown, stigma ochre-brown. Front wings faint yellow at base half-way out to first antenodal and cubito-anal cross-vein; 12 antenodals, 9 postnodals; three posttriangular cells, followed by two rows increasing to three rows at the level of the last (left), or next to the last (right), antenodal. Hind wings yellow at base in subcostal area half-way to first antenodal, in cubital area to the cross-vein (brownish in the extreme proximal end of this area), thence in the anal area to the apex of the membranule, this last dark grey, white at its extreme base; 8 antenodals, 9-10 postnodals, two posttriangular rows between  $M_4$  and  $Cu_1$ , increasing at the level of separation of  $M_3$ . Other venational details in the preceding table.

♀. Differs from the male as follows: face and lips more obscure, pale bluish-olive, where the male is greenish-yellow; brown of thorax with a metallic-blue reflection evident on the sides in the male; antehumeral yellow stripes not so distant at their lower ends (2 mm.); yellow stripe on each side of 4 reaching to three-fourth's length and on 5 to half-length. Appendages brown, as long as 9, more than twice as long as 10; apex acute; 11 (anal tubercle) more than half as long as the appendages. Vulvar laminare arching to two-fifths of the lateral margin of 9, bilobed in its apical third, lobes broad, rounded, not reaching the style-like processes on the sternum of 9, which are about one-sixth as long as the lateral margin. Apices of the wings in to the distal end of the stigma pale brown. Front wings with 10-11 antenodals, 7-8 postnodals; the two posttriangular rows increasing to three rows at the level of the penultimate antenodal; hind wings with the yellow of the subcostal area reaching out to the first antenodal, that of the cubital area not brown proximally.

Abdomen ♂ 28.5?, ♀ 24, hind wing ♂ 33.5, ♀ 30, costal edge of stigma, front wing ♂ 2.8, ♀ 3 mm.

*Habitat*: — SURINAM, 1 ♀, Paramaribo by Thorey, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

The abdomen widens but slightly and very gradually from the base of the third to the ninth segment, the latter 1.3 mm. wide, in the male, 1.5 mm. in the female. This feature, the colors, and the narrow pale antehumeral stripes give this insect a marked resemblance to the forms of *Dythemis velox* and have suggested the specific name proposed.

154. **Micrathyria atra** Martin.

*Micrathyria atra* Calvert. Biol. Centr.-Amer. Neurop., p. 225, pl. ix, figs. 13-15. 1906.

*Habitat*: — BRAZIL, Rio do Janeiro, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

This male has no single cell reaching from  $M_4$  to  $Cu_1$  on the left hind wing.

155. **Micrathyria spinifera** sp. nov.

(PLATE VII, FIG. 134.)

♂. Face and lips yellowish, becoming brownish with faint metallic-blue reflection on the upper surface of the frons; lateral labial lobes narrowly margined with blackish-brown mesially and anteriorly, free margin of labrum narrowly black in the middle, vertex brown with metallic-blue reflection; occiput brown, yellow behind.

Hind lobe of prothorax viewed from behind slightly, but distinctly, bilobed, bearing a row of long pale hairs.

Thoracic dorsum dark brown with a metallic blue-green reflection, a very narrow pale green antehumeral stripe reaching three-fifths of the way to the antealar sinus, parallel with the mid-dorsal carina and its fellow of the opposite side. Immediately in front of the green black-margined antealar sinus is a very fine isolated transverse pale green stripe. A pale green sinuous humeral stripe widening inward (mesad) at its lower half and confluent with the lower end of the above-described antehumeral stripe. Sides of the thorax predominantly pale green with the following dark brown stripes: one bordering the humeral suture posteriorly and enlarged in its upper half into a spot three times as wide as its lower half; a stripe on the obsolete first lateral suture and one on the second lateral suture, anastomosing with each other at the metastigma and again a short distance below the metastigma; the former also confluent with the posthumeral brown stripe at the lower end of the mesepimeron.

Abdomen narrowed at the base of segment 3 to 6 mm., thence

widening to the base of 8 (2.5 mm.), thence narrowing to 10 (1.2 mm.), blackish, the following pale green or yellow: the sides of 1; a basal dorsal spot on 2; a stripe or spot on each side of 3-7, beginning at the anterior end of each segment, and reaching to one-third of 3, to a shorter distance on 5-6, and to one-half of 7; each of these stripes or spots on 3-7 is about half as wide as the half of the dorsum, on which it lies.

Superior appendages black, subequal to 9 + 10, in dorsal view fusiform, with acute apices converging toward each other; in profile view directed somewhat ventrad as well as caudad in the proximal two-thirds, upward in the distal third, with an inferior tooth at two-thirds length, proximal side of this tooth sloping very gradually and bearing about six denticles; distal side of tooth forming an angle of about 100° with the appendage, the apex of which is an acute spine.

Inferior appendage about five-sixths as long as the superior; viewed from below its distal half is much narrower (about half) than the proximal half, apex slightly emarginate.

Anterior lamina not developed (unless it be represented by a pair of slender short finger-like processes near the middle line of the front part of segment 2); its place supplied by the first abdominal segment, which is produced ventrad much more than usual and at first sight appears to be the true lamina. Hamule complicated, in profile view longer antero-posteriorly than high, at its anterior end with two acute spine-like processes, both directed somewhat forward (cephalad), one directed ventrad, the other dorsad and apparently applied against one of the finger-like representatives (?) of the anterior lamina; at its hind end the hamule has a slender curved process applied against its fellow of the opposite side and directed caudad, laterad, and slightly dorsad; this last process is the most prominent part of the hamule in profile view. In ventral view the right and left hamules enclose a somewhat elongated opening closed before and behind; the ventral surface of each hamule is grooved for its entire length. Genital lobe produced vertically, so as to be subequally as prominent as the posterior hamular process, narrowing to its rounded apex chiefly on its posterior side.

Legs blackish.

Wings pale dirty yellow, slightly more intense along the anterior margins, hardly darker at the bases. Venation and stigmata dark brown or black, membranule brown. Front wings with 10-11 antenodals, 8-9 postnodals, two posttriangular rows increasing to three a

little distal to the level of the nodus. Hind wings with 7-8 antenodals, 9 postnodals, two posttriangular rows increasing to three near the level of separation of  $M_3$ . Other venational details in the preceding table.

Abdomen (segment 4 lost) 28?, hind wing 27, costal edge of stigma, front wing, 2.5 mm.

♀ Unknown.

*Habitat*: SURINAM, 1 ♂, Thorey. Museum of Comparative Zoölogy, Cambridge, Mass.

The specific name proposed refers to the structure of the genital hamule, which is very distinctive.

156. ***Micrathyria ocellata dentiens***, subsp. nov.

(PLATE VII, FIG. 130.)

♂♀ Brown stripe on the first lateral thoracic suture forked in its upper half, brown metepimeral stripe running off from near the lower end of the second lateral suture and reaching to the posterior margin of the sclerite. Pale green antehumeral stripes not reaching to the transverse green stripe in front of the antealar sinus.

♂ Abdominal segments 3-6 with a longitudinal yellow stripe on each side reaching from the base of each segment to more than half its length, although interrupted more or less by the transverse additional carina (3), or suture (4-6), the part behind always narrower than that in front of the carina or suture, or these stripes entirely absent from 6.

Superior appendages with the proximal inferior tooth situated nearer to the middle than two-fifths length, more prominent than the distal tooth and more prominent than in the type of *ocellata* from Ecuador or than in the Central American race of this species.

♂♀. Front wings with 8-9 (8) ♂, 7-9 ♀ antenodals, hind wings with 6 ♂♀; yellowish-brown on the base of the latter reaching to the cubito-anal (= submedian, de Selys) cross-vein, or not so far. Tips of all the wings uncolored.

Abdomen ♂ 21.5-23, ♀ 19-20.5; hind wing ♂ 23.5-25.5, ♀ 25-26; costal edge of stigma, front wing, ♂ 2-2.2, ♀ 2.3-2.6 mm.

*Habitat*: — BRAZIL, Bom Fim, November 2, 1907, 2 ♂, and Barreiras, January 4, 1908, 1 ♂, in the State of Bahia; Muniz Freire, Espiritu Santo, June 17, 1908, 2 ♀. All by J. D. Haseman. Carnegie Museum, Pittsburgh.

This subspecies agrees more closely with the Central American



form<sup>35</sup> of the species than with the type form from Ecuador in all of the differences separating these two given in *Biologia Centrali-Americana*, Neuroptera, page 226. *Ocellata dentiens* differs from both in the greater prominence of the proximal inferior tooth of the superior appendages and from *ocellata quicha* in the brown stripes of the sides of the thorax being wider than shown in B. C.-A. Neur. pl. IX, fig. 22.

The right front wing of one male from Bom Fim, and both front wings of one female from Muniz Freire have the internal triangle three-celled. Otherwise all five specimens agree with the venational features given in the table on page 229.

157. ***Micrathyria catenata*** sp. nov.

♂. Lips yellow, free margin of labrum, inner (mesial) margins of lateral labial lobes, and a median stripe on the middle lobes blackish. Frons and clypeus pale green, the former metallic-blue superiorly and extending down on to the anterior surface in the middle line, but not on the sides. Vertex metallic-blue, its tip yellow.

Thorax chiefly blackish-brown, the following pale green: a narrow stripe on each side of the mid-dorsal carina, each confluent superiorly with a transverse green stripe immediately in front of the antealar sinus (which also is green), thus forming an inverted L; a narrow antehumeral stripe extending from the anterior mesepisternal margin half-way up toward the antealar sinus; a wider, sinuous, indistinct, broken humeral stripe; a still wider mesepimeral stripe and one in front of the second lateral thoracic suture, both of which are interrupted a little above mid-height, and are narrower above the interruption; a metepimeral stripe bordering the latero-ventral suture and nearly half as wide as its sclerite.

Abdomen narrowed from 2 to the base of 4, thence widening gradually to the hind end of 7 (2 mm.), thence narrowing to 10, blackish; a pale green stripe on each side of the dorsum of 3-6, half as wide (or less) as the side of the dorsum on which it lies, interrupted on each segment by the additional transverse carina or suture, and reaching back to at least half the length of each segment. 7 with a large green spot on each side, separated from its fellow of the opposite side by a dark interval one-third its own width, reaching from anterior end to four-fifths of the length of the segment.

Superior appendages in dorsal view as long as 9 + 10, black, slen-

<sup>35</sup> For which the name *Micrathyria ocellata quicha* (from that of a human tribe) may be suggested.

der, approximated, converging by a slight curve throughout, with very acute spine-like apices; in profile view thickest at two-thirds length, where the inferior surface bears a small tooth, from which runs forward a row of denticles along the outer edge of the inferior surface to within one-third of the appendage-length; distal third of the appendage directed upward, apex very acute.

Inferior appendage reaching to three-fourths of the length of the superiors; in ventral view its distal two-fifths is strongly contracted, apex one-fourth as wide as the base.

Anterior lamina slightly more prominent than any other of the genitalia of segment 2, its apex entire, slightly convex when viewed from in front. Hamule hook-like, directed caudad, more prominent than the genital lobe, which latter is wider than long.

Wings with only the slightest tinge of ochraceous at the extreme bases, on the hind wings greater, but reaching only one-third way out to the cubito-anal cross-vein. Front wings with 8 antenodals, 7 postnodals, two posttriangular rows increasing to three near the level of the nodus. Hind wings with 6 antenodals, 8 postnodals. Other venational details on page 229.

Abdomen 25, hind wing 24 mm.

♀ unknown.

*Habitat*: BRAZIL, Minas Geraes, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

158. ***Micrathyria athenais*** sp. nov.

♂. Lips yellow, free labral margin narrowly black; submentum, mentum, middle labial lobe, inner (mesial) third, or more of lateral labial lobes, black. Clypeus and inferior margin of the frons pale green, remainder of frons and vertex metallic-blue.

Thorax and abdomen blackish, pruinose; indications of paler color on the mesinfraepisternum. Abdomen narrowing to 4, thence widening to the hind end of 7 as usual in this genus.

Superior abdominal appendages as long as 9 + 10, black, in dorsal view nearly straight, converging, apices acute; in profile view directed downward to four-fifths' length, where the inferior surface bears a small tooth the proximal side of which bears a row of 4-5 denticles, distal fifth directed upward, apex acute. Inferior appendage reaching to nine-tenths of the length of the superiors, its apex in ventral view one-fourth as wide as its base.

Anterior lamina much less prominent than either of the other two ordinarily visible genitalia of segment 2, its margin entire. Genital hamule subequally, or a little less prominent than the genital lobe, in profile view resembling that of *M. aequalis* in being wider at its apex, in ventral view its outline presents the form of a U the outer limb of which is a little longer than the inner, the convexity of the U being anterior. Genital lobe wider than long.

Wings practically uncolored; under a lens a very slight trace of ochraceous is visible at the extreme base of the hind pair.

♀. Differs from the male as follows: frons (except the inferior margin) and vertex reddish-yellow or reddish-brown, with some blue reflections. Thoracic dorsum dark brown, a medial greenish-yellow band, one-fourth to two-fifths as wide as either mesepisternum, continued forward on the prothorax and backward over the interalar area. Sides of the thorax brownish-yellow; a sinuous line on the humeral suture, a nearly straight stripe on the second lateral suture, the lower half of the metepisternum (enclosing a round yellow spot), much of the metepimeron, and the pectus, black. Abdomen yellow, becoming brownish posteriorly; a stripe bordering each lateral carina of 1-7, the mid-dorsal carina of 4-7, a transverse line on the hind ends of 2-7, most of 8-10, except the intersegmental articulations and a linear mark on each side of the dorsum of 8, black. Appendages as long as 9, three times as long as 10. Vulvar lamina reaching to the middle of the lateral margin of 9, with a rather shallow median notch. Style-like process of 9 apparently lost. Wings slightly obscured throughout, pale ochraceous in the subcostal and cubital spaces, as far as the first cross-vein of each.

♂♀. Front wings with 10 antedodals (11 in one wing of 1 ♂ = 5.5 per cent. ♂), hind wings with 7 (8 in one wing of 1 ♂ and in one wing of 1 ♀). The only variations from the venational features given in the synopsis on page 229 are that no one cell reaches from  $M_4$  to Cu, on the hind wings in two wings ♂ and two wings ♀; and that the discoidal triangle is free in the front wings of 1 ♂.

*Dimensions*: abdomen ♂ 23-26, ♀ 22.5; hind wing ♂ 27-31, ♀ 28-28.5 mm.

*Habitat*:—BRAZIL, Chapada, in May, by H. H. Smith, 4 ♂ and parts of 2 ♂, 1 ♀ and part of 1 other, some labeled, all presumably from the same locality. Carnegie Museum, Pittsburgh.

A male labeled "*Lib. athenais Selys Brésil*" in de Selys' hand; 2

♂ labeled "*Beschke*" and "*gerula*." Museum of Comparative Zoölogy, Cambridge, Mass. These latter two are doubtless the *Dythemis gerula* from Nova Friburgo, Brazil, of Hagen's List of South American Neuroptera in his Synopsis of 1861, page 317. They are younger than the other males, and have an orange spot on each side of the dorsum of abdominal segment 7, each spot about three-fifths as long and half as wide as the side on which it lies.

159. ***Micrathyria longifasciata* sp. nov.**

♂. Lips yellow, mesial margins of lateral labial lobes narrowly black. Clypeus and frons pale green, the latter metallic-blue above only in the center in front of the median ocellus for a width of 1 mm. Vertex metallic-blue. Occiput and rear of head shining black, a small yellow spot and streak behind each eye.

Thorax brown, or dull metallic-blue or -green obscured by some pruinosity, the following pale green: a narrow stripe on each side of, and close to, the upper half of the mid-dorsal carina, confluent above (or not confluent — Piedra Blanca) with a narrow transverse stripe in front of the antealar sinus; a narrow isolated antehumeral stripe occupying the middle third of the length of the mesepisternum (absent in the Piedra Blanca ♂); a nearly horizontal band, extending from the lower part of the mesepisternum and the mesinfraepisternum to the base of the abdomen; the average width of this band is slightly more than 1 mm., its upper edge is markedly zigzag with five points or "peaks"; pectus. Thorax and rear of the head with many pale hairs.

Abdomen narrowed to the anterior end of 4, thence widened to the hind end of 7 (2.5 mm.), thence narrowed to 10; black, pruinose at base, on 4 and 5 (and perhaps also 3 in earlier life); each side of dorsum with a linear yellowish spot at base and a yellowish longitudinal line after the transverse accessory suture (the line absent from 5 in the Piedra Blanca ♂); 7 with a yellowish spot on each side of dorsum, each spot three-fifths as long and three-fifths as wide as the side on which it lies, and separated from its fellow of the opposite side by the black mid-dorsal carina only.

Superior appendages a little longer than the mid-dorsal length of 9, brown in the proximal three-fifths, pale (green?) in the distal two-fifths, slender, in dorsal view slightly thickened at base and at two-thirds' length, apex acute; in profile view curved gently downward,

convex above, a row of about six denticles on the inferior surface in the third and fourth fifths of the appendage-length ; following the last denticle the inferior margin is obliquely truncated to form the acute apex ; there is a slight infero-internal denticle immediately after the base.

Inferior appendage reaching to slightly beyond the level of the last denticle of the superiors, in ventral view its apex one-third as wide as its base.

Genitalia of abd. seg. 2 very similar to those of *M. athenais* (see above).

Legs black, coxæ yellowish, first femora greenish inferiorly in their proximal half.

Hind wings yellow in the cubital space half-way (or all the way — Piedra Blanca) out to the cross-vein and in the two cells immediately adjoining the grayish membranule.

♀. Differs from the male as follows : metallic-blue on superior surface of frons still more reduced, forming a small triangular spot in front of the median ocellus ; reddish-brown replacing black on the occiput and rear of the head ; pale green stripes alongside of the mid-dorsal thoracic carina as long as the carina, anastomosing at the anterior mesothoracic margin with the anterior (lower) ends of the longer antehumeral stripe and of the almost horizontal band ; this last much less definite owing to the predominance of pale green on the sides of the thorax, there being from in front of the humeral suture only the following dark markings : a short stripe on the upper parts of the humeral and second lateral sutures, an inverted V-mark on the upper half of the mesepimeron, a triangular spot on the lower end of the mesepimeron and of the metepimeron, a smaller spot on the metinfra-episternum. Abdominal segments 1-3 green, their sutures and carinæ black ; 4 and 5 as in the male, but the spot and stripe wider (half as wide as the side of the dorsum on which they lie) and the stripe reaching to the hind end of each segment ; 6-10 lost. Yellow at the base of the hind wings reaching distad a little beyond the cubito-anal cross-vein, apices of all the wings from about the level of the proximal end of the stigma faintly brownish.

♂♀. Front wings with 8-9 antenodals, and two posttriangular rows increasing to three between the levels of the last and the next to last antenodals. Hind wings with 6 antenodals. All four specimens agree with the venational features given in the synopsis on page 229.

*Dimensions*: Abdomen ♂ 33, ♀ ?; hind wing ♂ 23-26, ♀ 25 mm.

*Habitat*: — BRAZIL, Cuyabá, 1 ♂ (head lacking); Corumbá, May, 1 ♀ (abd. segs. 6-10 lacking).

BOLIVIA, Piedra Blanca, April, 1 ♂ (abd. segs. 6-10 lacking).

ARGENTINA, Goya, east side of the Rio Paraná, December 22, 1 ♂.

All four specimens by H. H. Smith. Carnegie Museum, Pittsburgh.

The Goya male is the type of the species. The Piedra Blanca male is the smallest of its sex.

The specific name proposed refers to the very characteristic, almost horizontal, pale green band of the sides of the thorax.

160. ***Micrathyria macrocercis*** sp. nov.

(PLATE VII, FIG. 136.)

♂. Lips yellow, mesial margins of lateral labial lobes narrowly black. Clypeus and frons pale green, the latter with a small superior triangular brown spot, with metallic-blue reflections in front of the median ocellus. Vertex metallic-blue. Occiput and rear of head shining black, the former with two small pale green posterior spots.

Thoracic dorsum dark metallic-green-brown, the dark mid-dorsal carina bordered on each side with a pale green stripe, one-fifth as wide as the mesepisternum on which it lies, and confluent above with a narrower transverse stripe in front of each antealar sinus; a minute isolated antehumeral green line on the center of the sclerite. Sides of the thorax pale green, a short stripe on the upper halves of the mesepimeron, metepisternum, and second lateral thoracic suture, a spot above the metastigma, one on the lower ends of the mesepimeron and of the metepimeron, blackish.

Abdomen of the usual shape, blackish, 2-7 with a stripe on each side nearly as long as each segment (except on 2) and half as wide as the side of the dorsum on which it lies, pale green on 2 and 3, almost orange on 4-7.

Superior appendages (1.8 mm.) almost as long as 8 + 9, longer than 9 + 10, very slender, in dorsal view almost straight, pale green in the middle, brown at both ends, slightly thickened at two-fifths' length, thence gradually tapering to the very acute apices; in profile view gently curved downward, so that the upper margin is concave, but the extreme apex more strongly decurved; inferior surface at two-fifths' length with a slight tooth, between which and the base are 5-6 denticles.

Inferior appendage half as long as the superiors, its apex in ventral view one-third as wide as its base, ochreous.

Anterior lamina extremely small, hamule and genital lobe subequally prominent, the former bifid, outer branch longer.

Wings uncolored, antenodals of all the wings and some adjoining cross-veins pale yellow, much of the remaining venation reddish, stigma pale yellow. Front wings with 8 (7 in one wing) antenodals, hind wings with 6.

Abdomen 17.5, hind wing 18-18.5 mm.

♀ unknown.

*Habitat*: — BRAZIL, Cachoeira, 1 ♂, no. 36; Cuyabá, 1 ♂ (abd. segs. 6-10 lost); both by H. H. Smith. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, by W. T. Foster, November 1 ♂, December 1 ♂, U. S. National Museum.

#### 161. *Micrathyria tibialis* Kirby.

*Micrathyria tibialis* Kirby, Ann. Mag. Nat. Hist. (6) xix, p. 610, pl. xiii, figs. 5, 6 (entire insects ♂, ♀). 1897.

*Habitat*: — BRAZIL, Bonito, in Pernambuco, December 30, 1882, 1 ♂. U. S. National Museum.

Rio Grande do Sul, 1 ♀; Uacaryzal, 1 ♂, 1 ♀; Cachoeira, 1 ♂ no. 51.

BOLIVIA, Piedra Blanca, April, 1 ♂, 1 ♀ and parts of two others.

PARAGUAY, Concepcion, 1 ♀.

All but the Bonito ♂ by H. H. Smith. Carnegie Museum, Pittsburgh.

#### 162. *Micrathyria eximia* Kirby.

*Micrathyria eximia* Calvert, Biol. Centr.-Amer. Neurop., p. 230, pl. ix, figs. 28-30 (genit., apps., ♂, venation ♀). 1906.

*Habitat*: — BRAZIL, Cuyabá, 1 ♂; Chapada, 3 ♂ and part of 1 other, no. 36; Cachoeira, 1 ♂, no. 52; all by H. H. Smith. Carnegie Museum, Pittsburgh.

Minas Geraes, 1 ♂; Rio de Janeiro, by Reinhardt, 1 ♀. Museum of Comparative Zoölogy, Cambridge, Mass.

#### 163. *Nephepeltia flavifrons* Karsch.

*Nephepeltia flavifrons* Calvert, Biol. Centr.-Amer. Neurop., p. 230. 1906.

*Habitat*: — BRAZIL, Rio Grande do Sul, by H. H. Smith, 1 ♀ and part of 1 ♂. Carnegie Museum, Pittsburgh.

The thorax of the female is almost entirely yellow ; abdominal segments 6-10 are a little wider than those preceding.

Agreeing with the characters given here and in the text quoted, but of smaller size (in this respect closely approaching the next species), are 2 ♂ from Barreiras, State of Bahia, January 4, 1908, by J. D. Haseman, 1 ♂ from Cuyabá and 1 ♂ (no. 42) from Cachoeira by H. H. Smith. Carnegie Museum, Pittsburgh.

164. *Nephepeltia æquisetis* sp. nov.

Triangular area on the metasternum with only a small tubercle ; front wing with one cell between the internal triangle and hind margin ; third tibia of the male with the spines of the outer and inner rows subequal in size and number (10-13) ; tooth of the inferior surface of the superior appendages at three-fourths of the appendage-length, beyond which tooth the remainder of the appendage is hardly curved upward, but tapers to an acute apex. (In *N. flavifrons* the tooth is at mid-length, the distal half of the appendage is distinctly curved upward, and remains of almost the same thickness to the short spine, which forms the apex). Inferior appendage reaching almost to the level of the tips of superiors (only to three-fourths length in *flavifrons*). Both sexes have the abdomen widened in segments 7-10.

*Dimensions* : abdomen ♂ 12-13.5, ♀ 12.5-13 ; hind wing ♂ 15-16, ♀ 15-17.

*Habitat* : — BRAZIL, Cuyabá, 11 ♂, 11 ♀ ; Cachoeira, 1 ♂, 2 ♀, no. 6., also 1 ♂ "flooded campos," January 26 ; Chapada, 1 ♀ ; Corumbá, April, 3 ♂, 3 ♀.

BOLIVIA, Piedra Blanca, April, 2 ♂, 1 ♀.

All by H. H. Smith, Carnegie Museum, Pittsburgh.

165. *Orthemis ferruginea* Fabricius.

*Orthemis ferruginea* Calvert, Biol. Centr.-Amer. Neurop. pp. 234, 403, pl. ix, fig. 34. 1906, 1907.

*Habitat* : — COLOMBIA, Bonda, in November, by H. H. Smith, 1 ♂, 1 ♀. Carnegie Museum, Pittsburgh.

VENEZUELA, La Guaira, July 27, 1900, by Lyon and Robinson, 10 ♂, 5 ♀.

BOLIVIA, near Coroico, Yungaz, May 31, 1899, by W. J. Gerhard, 1 ♂. Academy of Natural Sciences, Philadelphia.

BRAZIL, Victoria, July 20, 1900, by A. Hempel, 1 ♀. Academy of Natural Sciences, Philadelphia.



Januariã, in Minas Geraes, December 12, 1907, by J. D. Haseman, 1 ♂. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, November to March, by W. T. Foster, 15 ♂, 7 ♀. U. S. National Museum.

BAHAMAS, Eleuthera, April 11-21, 1897, by C. J. Maynard, [November 14, 1890, 1 pair in coitu]; New Providence, vicinity of Nassau, June 28-July 1, 1904, by Allen, Barbour, and Bryant, 2 ♂; Andros, Mangrove Cay, August 1, 1904, by O. Bryant, 2 ♂; Cat, Port Hour, [Nov. 21, 1890, 1 ♂]. The specimens in brackets [] by J. P. Moore and D. J. Bullock, University of Pennsylvania Expedition; the others in the Museum of Comparative Zoölogy.

166. *Orthemis æquilibris* sp. nov.

♀. Belonging to the group of *O. ferruginea* and *sulphurata* (group A, Biol. Centr.-Amer. Neurop., p. 232). Labium yellow, with a median dark brown band 2-2.5 mm. wide, femora and tibiæ superiorly reddish-brown, tip of wings clear or smoky. Sides of thorax brown, somewhat purplish in some, with two horizontal longitudinal greenish or greenish-yellow bands; the upper 1-1.2 mm. wide, beginning on the upper end of the mesinfraepisternum and lower end of the mesepisternum and extending to the upper half of the hind margin of the metepimeron, slightly interrupted at the humeral and second lateral sutures; from the band a short slender indistinct stripe runs upward bordering the humeral suture anteriorly; the lower band, .3-.6 mm. wide, borders the latero-ventral metathoracic carina for its whole length, and is continued forward to the base of the second leg by two separated larger spots. Mid-dorsal thoracic carina and a narrow contiguous stripe on each side thereof greenish-yellow, the whole forming a band .8-1 mm. wide. Abdomen moderately stout, 2.7-3.5 mm. wide at the base of 4, this segment 1.4 times as long as wide. Labrum orange, free margin, and a transverse (to long axis of *body*) median mark of variable length, black.

Abdomen 28-33, hind wing 38-43 mm.

♂. Unknown.

*Habitat*:—SURINAM, 2 ♀. U. S. National Museum.

Paramaribo, by Miss Kate Mayo, 2 ♀, one dated December 18, 1904. Academy of Natural Sciences of Philadelphia.

VENEZUELA, 1 ♀. U. S. National Museum.

BRAZIL, Bom Fim in Bahia, November 3, 1907, at north edge of

town, 1 ♀; Muniz Freire, in Espiritu Santo, June 17, 1908, 1 ♀; Sete Lagoas, in Minas Geraes, May 4, 1908, 1 ♀; all by J. D. Hase-man. Carnegie Museum, Pittsburgh.

One of the Paramaribo examples is the type.

The two females from Surinam, in the U. S. National Museum, are the smallest, and have the stigma of the front wings only 5.5 mm. long, which is less than the dimensions given in the "Biologia" volume quoted for group A.

167. **Orthemis ambirufa** sp. nov.

♂. Belonging to the group of *O. levis* (group CC, Biol. Centr.-Amer. Neurop., p. 233). Abdomen stouter, segment 4 being 2.8 times as long as its width at apex, 3.2 times as long as its width at base. Labrum reddish; abdomen reddish; no black on the dorsum of 8-10. Thorax somewhat faded, its color-pattern very similar to that figured for *levis* (*l. c.*, pl. viii, fig. 38), differing chiefly in the absence of the first pale antehumeral stripe, and the more uniform width of the pale mesepimeral stripe (about 1 mm.). Genitalia of the second abd. seg. apparently not different.

Abdomen 34, hind wing 38 mm.

♀ unknown.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

168. **Orthemis ambinigra** sp. nov.

♂. Belonging to the group of *O. levis* (group CC, Biol. Centr.-Amer. Neurop., p. 233). Abdominal segment 4 three times as long as its width at apex; segments 8 and 9 with a mid-dorsal black band about one-third as wide as 8, a little wider on 9. Labrum black. Thorax much faded, its color-pattern probably similar to that of *ambirufa*. Genital hamule with the external branch wider than in *O. levis* or in *O. ambirufa*. (Cf. Biol. Centr.-Amer. Neur., pl. ix, fig. 39.)

Abdomen 32, hind wing 35 mm.

♀ unknown.

*Habitat*: — BRAZIL, Rio de Janeiro, in January, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

169. **Orthemis cultriformis** Calvert.

*Orthemis cultriformis* Calvert, Biol. Centr.-Amer., Neurop., p. 239. 1906.

PARAGUAY, Sapucay, by W. T. Foster, November and December, 1899, 7 ♂ 3 ♀. U. S. National Museum.

170. *Cannaphila vibex* Hagen.

*Cannaphila vibex* Calvert, Biol. Centr.-Amer. Neurop., p. 243, pl. viii, fig. 35. 1906.

*Habitat*:—COLOMBIA, Onaca, August, 2 ♂, December, 4 ♂, by H. H. Smith. Carnegie Museum, Pittsburgh.

BOLIVIA, Chulumani, November 28, 1898, 1 ♂, and January 5, 1899, 1 ♀, by W. J. Gerhard. Academy of Natural Sciences of Philadelphia.

171. *Dasythemis mincki* Karsch.

(Cf. Ris, Deut. Ent. Zeitschr. 1908, p. 528.)

*Habitat*:—BRAZIL, Rio Grande do Sul, by H. H. Smith, 2 ♂, 2 ♀. Carnegie Museum, Pittsburgh.

172. *Dasythemis venosa* Burmeister.

*Dasythemis venosa* Calvert, Trans. Amer. Ent. Soc. xxv, p. 58, pl. i, fig. 7. 1898.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 3 ♂ and parts of 10 others; 3 ♀ and parts of 3 others, some dated May, some December, some labelled 6, 19, 33, or 44. Carnegie Museum, Pittsburgh.

173. *Anatya normalis* Calvert.

*Anatya normalis* Calv., Biol. Centr.-Amer. Neurop., p. 245. 1906.

*Habitat*:—COLOMBIA, Bonda, August, 1 ♀; Don Diego, not dated, 2 ♀, by H. H. Smith. Carnegie Museum, Pittsburgh.

174. *Anatya guttata* Erichson.

*Anatya guttata* Calvert, l. c. 1906.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 4 ♂ and parts of 4 others; 6 ♀ and parts of 1 (or 5?) others. Carnegie Museum, Pittsburgh.

175. *Erythrodiplax umbrata* Linnæus.

*Erythrodiplax umbrata* Calv., Biol. Centr.-Amer. Neurop., p. 251. 1906.

*Habitat*:—COLOMBIA, Bonda, July, 1 ♀, August, 5 ♂, 6 ♀, September, 3 ♂, 2 ♀, October, 1 ♂, 1 ♀, November, 2 ♀, by H. H. Smith.

BRAZIL, Campo Largo, January 1, 1908, 1 ♂, 1 ♀; Urubú, December 8, 1907, 1 ♂; Boqueiraõ, January 7, 1908, 1 ♂, 1 ♀; all in Bahia, by J. D. Haseman.

Cachoeira Cuyabá, January 26, 1 ♂; Rio de Janeiro, January, 1 ♀; by H. H. Smith.

The preceding in the Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, by W. T. Foster, September, 1902, 4 ♂, December, 1899 and 1903, 9 ♂, 7 ♀, January to March, 1900, 5 ♂, 2 ♀. U. S. National Museum.

BAHAMAS, Strange Cay, July 14, 1904, by Allen, Barbour, and Bryant, 2 ♂, 1 ♀ and 1 homœochromatic ♀. New Providence, vicinity of Nassau, June 28–July 1, 1904, by the same, 2 ♂, 1 ♀. Andros, Mangrove Cay, August 1, 1904, by O. Bryant, 3 ♂. All in Museum of Comparative Zoölogy, Cambridge, Mass.

176. **Erythrodiplax ochracea** Burmeister.

*Erythrodiplax ochracea* Calv., *l. c.*, p. 255. 1906.

*Habitat*:—BRAZIL, Barreiras, in Bahia, January 4, 1908, 3 ♂ (2 ♀ ?); São Joas da Barra (near Rio Parahyba), June 24, 1908, 1 ♂; Ururahy, June 30, 1908, 1 ♂; by J. D. Haseman. Carnegie Museum, Pittsburgh.

Farther south this species appears to be represented by smaller individuals, 3 ♂, 6 ♀ (abdomen ♂ 19, ♀ 17.5; hind wing ♂ 22, ♀ 21 mm.) from Piedra Blanca, in Bolivia, by H. H. Smith, and perhaps some slightly larger (abd. 19, h. w. 22) females from Concepcion, Paraguay, by the same collector, also belong here. Carnegie Museum, Pittsburgh.

177. **Erythrodiplax erichsoni?** Kirby.

*Erythrodiplax erichsoni?* Calv., *l. c.*, p. 256. 1906.

*Habitat*:—COLOMBIA, Don Diego, 2 ♂.

BRAZIL, Rio de Janeiro, in November, 1 ♂. H. H. Smith. Carnegie Museum, Pittsburgh.

178. **Erythrodiplax venusta** Kirby.

*Micrathyria venusta* Kirby, Ann. Mag. Nat. Hist. (6) xix, p. 612, pl. xiii, fig. 1. 1897.

*Habitat*:—BRAZIL, Cachoeira, part of 1 ♂, no. 47, by H. H. Smith. Carnegie Museum, Pittsburgh.

179. **Erythrodiplax connata** Burmeister.

*Erythrodiplax connata* Calvert, Biol. Centr.-Amer. Neurop., p. 259. 1906.

form *d.* Calvert, *l. c.*, p. 260.

*Habitat*:—BRAZIL, Desterro, December, 1 ♂, by H. H. Smith. Carnegie Museum, Pittsburgh.

form *e.* Calvert, *l. c.*, p. 261.

COLOMBIA, Bonda, July, 1 ♀, August, 5 ♂, 1 ♀, September, 1 ♂, 1 ♀, October, 10 ♂, November, 2 ♂, 5 ♀, December, 2 ♂, 2 ♀, January 1 ♂, 1 ♀; Onaca, August, 1 ♂, 1 ♀, December, 1 ♂; by H. H. Smith. Carnegie Museum, Pittsburgh.

VENEZUELA, La Guaira, July 27, 1900, by Lyon and Robinson, 2 ♂, 1 ♀. U. S. National Museum.

BRAZIL, Chapada, 22 ♂, 1 ♀, some dated December, some numbered 24, 25, 44, 101, 102, 103, 107, and 117 by the collector; Rio Grande do Sul, 2 ♂, by H. H. Smith. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, by W. T. Foster, September, 1902, 2 ♂, November, 1901, 1 ♂, December, 1899, 1901, 1902, 10, ♂, 3 ♀, March, 1900, 1 ♂. U. S. National Museum.

form *b'*. Calvert, *l. c.*, p. 264.

BRAZIL, Chapada, 33 ♂, 10 ♀, more or less perfect, some dated May, some December, some numbered 21, 58, 59, 104, 131, 133*a*, 135, and 181 by the collector, H. H. Smith. Carnegie Museum, Pittsburgh.

180. **Erythrodiplax minuscula** Rambur.

*Erythrodiplax minuscula* Calvert, *l. c.*, p. 267. 1906.

*Habitat*:—BRAZIL, Chapada, 27 ♂, 14 ♀, some dated May, some December; some numbered 52 or 131 by the collector; Corumbá, May, 1 ♂; Cuyaba, lakes, January, 1886, 3 ♂, 6 ♀; Cachoeira, Cuyabá Lagoa, January 29, 6 ♂, 8 ♀, some numbered 44 or 45, Rio Grande do Sul, 1 ♂.

BOLIVIA, Piedra Blanca, April, 3 ♂.

All by H. H. Smith. Carnegie Museum, Pittsburgh.

181. **Erythrodiplax berenice næva** Hagen.

*Erythrodiplax berenice næva* Calvert, *l. c.*, p. 270. 1906.

*Habitat*:—BAHAMAS, Andros Island, Mangrove Cay, August 2, 1904, by O. Bryant, 1 ♂, 3 heterochromatic ♀. Museum of Comparative Zoölogy, Cambridge, Mass.

182. **Dythemis velox** Hagen.

*Dythemis velox* Calvert, Biol. Centr.-Amer. Neurop., p. 272. 1906.

*Habitat*:—COLOMBIA, Bonda, July, 1 ♂, August, 2 ♂, November, 2 ♂, 1 ♀.

BRAZIL, Rio de Janeiro, May, 1 ♂, November, 1 ♀. Rio Grande do Sul, 1 ♂.

All the preceding by H. H. Smith. Carnegie Museum, Pittsburgh.

Muniz Freire in Espiritu Santo, June 17, 18, 1908, by J. D. Haseman, 1 ♂, 1 ♀. Carnegie Museum.

PARAGUAY, Sapucay, by W. T. Foster, November, 1899, 1 ♂, January, 1900, 2 ♂. United States National Museum.

183. **Dythemis constricta** Calvert.

*Dythemis constricta* Calv., Proc. Bost. Soc. Nat. Hist. xxviii, p. 311, pl. i, fig. 16. 1898.

*Habitat*: — BRAZIL, Bom Fim in Bahia, at the Fazenda de Amaturu, November 21, 1907, by J. D. Haseman, 1 ♂. Carnegie Museum, Pittsburgh.

184. **Dythemis cannacioides** Calvert.

*Dythemis cannacioides* Calv., Biol. Centr.-Amer. Neurop., pp. 276, 405, pl. viii, figs. 43, 44, pl. x, fig. 13. 1906, 1908.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 4 ♂, 1 ♀. The Carnegie Museum, Pittsburgh.

185. **Brechmorhoga præcox** Hagen.

*Brechmorhoga præcox* Calvert, l. c., pp. 281, 405, pl. viii, fig. 49. 1906, 1908.

*Habitat*: — COLOMBIA, Bonda, July, 2 ♂, 2 ♀, November, 1 ♂, 1 ♀, December, 1 ♂, 2 ♀; Onaca, November, 1 ♀; by H. H. Smith. Carnegie Museum.

The November male tends toward *B. postlobata* Calvert.

186. **Brechmorhoga prædatrix** sp. nov.

♂. Closely related to *B. præcox*. Agreeing with the characters of this species, as given in the Synopsis for the genus, Biol. Centr.-Amer. Neurop., pp. 278, 279, under the rubrics A, B (except that the genital lobe is half as prominent as the anterior lamina, pale mark on each side of the dorsum of 7 a stripe one-fourth as wide, or less, as the half of the segment on which it lies), C and DD (except that the labrum has a median, and on each side a lateral, brown spot, while the hamule is shaped almost as in *nubecula*, but its apex is not quite so acute). The hind wings have two posttriangular rows beginning at the triangle.

Abdomen 34-37, hind wing 30-31 mm.

♀ unknown.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 5 ♂. Carnegie Museum, Pittsburgh.

187. *Brechmorhoga nubecula* Rambur.

*Brechmorhoga nubecula* Calvert, Biol. Centr.-Amer. Neurop., p. 285. 1906.

*Habitat*: — COLOMBIA, Onaca, August, 1 ♂.

BRAZIL, Rio de Janeiro, November, 2 ♂, 5 ♀, December, 1 ♂, 1 ♀; Chapada, November, part of 1 ♂, December, 2 ♂, 1 ♂. All the preceding by H. H. Smith, Carnegie Museum, Pittsburgh.

Sete Lagoas in Minas Geraes, May 7, 1908, by J. D. Haseman, 1 ♂. Carnegie Museum.

188. *Brechmorhoga inequiunguis* Calvert.

*Brechmorhoga inequiunguis* Calvert, Biol. Centr.-Amer. Neurop., pp. 286, 406. 1906, 1908.

*Habitat*: — COLOMBIA, Onaca, in December, by H. H. Smith, 1 ♂.

BRAZIL, Rio de Janeiro, November, by the same, 2 ♂. All 3 ♂, Carnegie Museum, Pittsburgh.

189. *Brechmorhoga heteronycha* sp. nov.

(PLATE IX, FIG. 147.)

♂♀. Internal triangle of the front wing more often 2-celled; hind wing with more often 1 (♂) or 2 (♀) posttriangular rows; 1 cell between the hind angle of the triangle and  $A_2$  immediately opposite; 2 rows of cells between and parallel to  $A_3$  and the anal angle; 1 anal cell between the hind angle of the triangle and the point of origin of  $A_2$ ; two cubito-anal cross-veins. Wings faintly yellow, venation orange and yellow. Frons pale green and deeply bifid superiorly, forming two divergent, almost conical tubercles, thus resembling the frons of *Gomphomacromia paradoxa*, pale luteous anteriorly. Legs pale brownish-yellow. Abdomen not widened on the posterior segments, blackish-brown with green or yellow stripes and spots.

♂. All the wings with an ochre-brown basal spot, occupying the costal, subcostal, and median areas out to the first antenodal. Tooth of the tarsal nails less than half as long as the tip of the nail itself on both nails of the first leg and on the inner (or posterior) nail of the second and of the third leg; as long as the tip of the nail itself on the outer (anterior) nail of the second and third legs. Superior appendages with the apex acute.

♀. The ochre-brown basal spot on front wing reaching to the second antenodal; a second basal streak in the cubital area to the

cross-vein, occupying also some of the anal area at base. The hind wings also with two ochre-brown basal streaks in the same areas, the first reaching to the upper end of the arculus, the second to the second (or distal) cubito-anal cross-vein and posteriorly to the apex of the membranule; these two basal streaks are fused at base, but separate; distal to the level of the first cubito-anal cross-vein in the median area. Tooth of the nails less than half as long as the tip of the nail itself on both nails of all the legs.

*Dimensions*: Abdomen ♂ 26.5, ♀ 23; hind wing ♂ 23.5-24, ♀ 24.5 mm.

*Habitat*:—BRAZIL, Chapada, by H. H. Smith, 1 ♂ and parts of 6 others; 2 ♀ and part of 1 other, no. 100. Carnegie Museum, Pittsburgh.

The sexual difference in the tarsal nails is interesting, and furnishes a transition from the condition found in the more typical species of *Brechmorhoga*, or of *Dythemis*, to that observed in *Macrothemis*. On comparing the tarsal nails of the same leg, it is evident that the outer nail of the second and third legs is distinctly shorter than the inner nail, the length of both nails being subequal to the tip of the tooth; the shorter length of the outer nail is due to a shortening of the tip of the nail itself.

#### Genus MACROTHEMIS.

♂ I. Hind wings of ♀ with only one row of posttriangular cells. (♂ unknown.)

#### 190. *Macrothemis uniseries* sp. nov.

♀. Wings with a basal brown streak in the subcostal area reaching half-way to the first antenodal on the front wings, two-thirds-way to the first antenodal on the hind wings, on which latter the brown overflows a little at the extreme base into the costal and median areas; cubital area of hind wings from base to cross-vein a little less deeply brown than the streak just described; first two anal cells bordering the anal vein distal to membranule yellow.

Pale green antehumeral stripes faded, apparently similar to those of *musiva* [*i. e.* T-shaped]; sides of thorax pale green; a dark brown stripe on the obsolete first lateral thoracic suture to a short distance above the metastigma, where it enlarges into a rounded spot; a narrower dark brown stripe on the second lateral thoracic suture for its entire length, narrowing upward.

Abdomen 30, hind wing 27 mm.

♂ unknown.



*Habitat*:—BRAZIL, Rio Grande do Sul, by H. H. Smith, 1 ♀. Carnegie Museum, Pittsburgh.

Different from other females of *Macrothemis*, except *M. pumila*, by the single posttriangular row of the hind wings. Different from *pumila* by its larger size and the basal brown streaks of the wings.

§ II. Hind wings of the ♀ with two, of the ♂ with one posttriangular row.

191. ***Macrothemis musiva*** Calvert.

*Macrothemis musiva* Calv., Biol. Centr.-Amer. Neurop., p. 289. 1906.

*Habitat*:—COLOMBIA, Bonda, December, 1 ♂, and Onaca, December, 1 ♂.

BRAZIL, Rio de Janeiro, 1 ♂; Chapada, 1 ♂.

The preceding by H. H. Smith. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, January, 1900, by W. T. Foster, 3 ♀. U. S. National Museum.

192. ***Macrothemis capitata*** sp. nov.

♂. Falls under the rubrics A and B of the synopsis of this genus in Biol. Centr.-Amer. Neurop. p. 288, except that the pale green antehumeral stripes are capitate, not T-shaped.

Most, but not all, of the metallic-blue area of the frons occupied by two pale green spots, separated from each other by a black line wider above. Vertex blackish.

Abdomen 26, hind wing 25–26 mm.

♀ uncertain.

*Habitat*:—BRAZIL, Desterro, December, by H. H. Smith, 2 ♂. Carnegie Museum, Pittsburgh.

This species is near to *M. tenuis* Hagen, but is smaller, and has only one cubito-anal cross-vein on the hind wings.

193. ***Macrothemis imitans*** Karsch.

*Macrothemis imitans* Calvert, Proc. Bost. Soc. Nat. Hist. xxviii, pp. 319, 329, pls. i, ii. 1898.

VENEZUELA, 4 ♂, 2 ♀. U. S. National Museum.

BRAZIL, Chapada, by H. H. Smith, 2 ♂, 1 ♀, no. 121. Carnegie Museum, Pittsburgh.

194. ***Macrothemis pseudimitans*** Calvert.

*Macrothemis pseudimitans* Calvert, Biol. Centr.-Amer. Neurop. pp. 290, 406. 1906, 1908.

*Habitat*:—BRAZIL, Muniz Freire in Espiritu Santo, June 18, 1908, by J. D. Haseman, 1 ♂, 1 ♀.

Rio de Janeiro, 1 ♂, and Chapada, May, 1 ♂ and parts of 2 others, by H. H. Smith.

All in the Carnegie Museum, Pittsburgh.

All these are smaller than the dimensions given in the work cited, and measure abdomen ♂ 23.5–25, ♀ 22; hind wing ♂ 25–28, ♀ 28 mm.

195. **Macrothemis hemichlora** Burmeister.

*Macrothemis hemichlora* Calvert, Biol. Centr.-Amer. Neurop. pp. 290, 406. 1906, 1908.

*Habitat*:—COLOMBIA, Bonda in August, 1 ♀.

BRAZIL, Rio de Janeiro in November, 2 ♀; Chapada, 3 ♀. All six by H. H. Smith.

Sete Lagoas in Minas Geraes, May, 1908, by J. D. Haseman, 1 ♀. All in the Carnegie Museum, Pittsburgh.

196. **Macrothemis flavescens?** Kirby.

*Miathyria flavescens?* Kirby, Ann. Mag. Nat. Hist. (6) xix, p. 600, pl. xiii, fig. 2. 1897.

*Macrothemis flavescens?* Calv., Proc. Bost. Soc. Nat. Hist. xxviii, p. 328. 1898.

♂. Falls under rubrics A (except that the apices of the superior appendages are not acute), BB (except that the hind wings have two rows between  $A_3$  and the anal angle, superior appendages with no tooth or denticles) and CC (except that the inferior appendage has its tip only one-fourth as wide as base and only slightly notched) of the synopsis of species in Biol. Centr.-Amer. Neurop. p. 288.

Abdomen 22.5–23, hind wing 24.5–25 mm.

*Habitat*:—BRAZIL, River Cuyabá, January 23, 1886, 1 ♂; Cachoeira Cuyabá, open place near river, January 25, 1 ♂, both by H. H. Smith. Carnegie Museum, Pittsburgh.

197. **Macrothemis declivata** sp. nov.

(PLATE VII, FIGS. 137, 138.)

Falls under rubrics A and BB (except that the hind wings of the ♂ have 4–5 rows of cells between  $A_3$  and the anal angle, and the inferior denticles of the superior appendages are on the third fourth) of the synopsis of species in Biol. Centr.-Amer. Neurop. p. 288. The green antehumeral stripes are 2.5 mm. long, narrow gradually forward (downward) and stop at about .5 mm. from the inferior transverse mesepisternal carina. Sides of the thorax pale green, with two complete blackish stripes at the first and second lateral sutures respectively.

♂. Differs from all other species in having the apex of the superior appendages a little produced and curved ventrad and laterad. Abdominal segment 8 at base 3 mm. wide.

♀. Wings yellowish from base to nodus for entire (front) or almost the entire (hind) width. One ♀ has only one posttriangular row on both hind wings for three cells, but the other two have two rows.

*Dimensions*: — Abdomen ♂ 29.5, ♀ 29; hind wing ♂ circa 33, ♀ 34–35 mm.

*Habitat*: — BRAZIL, Rio de Janeiro, by H. H. Smith, 1 ♂, 3 ♀, some dated November. Carnegie Museum, Pittsburgh.

198. **Macrothemis marmorata** Hagen.

*Macrothemis marmorata* Calvert, Proc. Bost. Soc. Nat. Hist. xxviii, pp. 318, 323, pl. ii, fig. 33. 1898.

*Habitat*: — BRAZIL, Rio Grande de Sul, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

199. **Macrothemis griseofrons** sp. nov.

♂. Falls under rubric AA of the synopsis of species, Biol. Centr.-Amer. Neurop. p. 289, except as follows: thorax and most of the abdomen pruinose, 8–10 and the appendages brown, the superior appendages acute at tip.

Frons and vertex pale bluish-gray, nasus and rhinarium luteous, labrum orange. Hamule most prominent of the genitalia of abd. seg. 2, anterior lamina more prominent than the genital lobe, entire. Hind wings ochraceous in part of the anal area, beginning at the anal vein and extending back 4 mm. and from the membranule distad to two cells immediately bordering the anal vein, centres of the cells a little paler.

Abdomen 27.5, hind wing 30 mm.

♀ unknown.

*Habitat*: — BRAZIL, Bom Fim in Bahia, November 20, 1907, by J. D. Haseman at the Fazenda de Amaratu, 1 ♂. Carnegie Museum, Pittsburgh.

200. **Macrothemis lutea** sp. nov.

♂. Abdomen very long and slender, not widened on 7–8, luteous, with the sutures, carinæ, and (on 4–9) on each side of dorsum a narrow stripe, black. Thorax pale olive-green with black lines on parts of the lateral sutures. Hind wings with one posttriangular row, three

rows between and parallel to  $A_3$  and the anal angle. 2 cells between the hind angle of the triangle and the point of origin of  $A_2$ , 1 cell between the hind angle of the triangle and  $A_2$  immediately opposite that angle. Superior appendages not acute at the extreme tip, with an inferior tooth at three-fourths' length.

Abdomen 40.5, hind wing 34.5 mm.

♀ unknown.

*Habitat*:—BRAZIL, Propria in Sergipe, March 31, 1908, by J. D. Haseman, 1 ♂. Carnegie Museum, Pittsburgh.

GYNOTHEMIS<sup>36</sup> gen nov.

Falling in the synopsis of Mexican and Central American genera of Libellulinae (in Biol. Centr.-Amer. Neurop. p. 202), under the same rubric as *Paltothemis*, but differing therefrom as follows: area between the anal angle of the hind wings and  $A_3$  with the cells not arranged as described for *Paltothemis*, nor in rows parallel to the anal angle or to  $A_3$ , but more irregularly; only one row of cells between  $R_5$  and the supplementary sector next below,  $M_2$  not waved; front wings with the discoidal triangle free and two posttriangular rows from triangle to wing-margin; femora in both sexes armed with the usual two rows of spines as in most Libellulinae, those of the male not differentiated as they are in *Macrothemis*, *Brechmorhoga*, etc.

Type: *Gynothemis venipunctata* sp. nov.

201. **Gynothemis venipunctata** sp. nov.

(PLATE IX, FIG. 146.)

Wings ochraceous at base, on the front pair for their entire width out to the distal angle of the triangle, on the hind pair from the anterior margin to within two cells of the hind margin and out to two or three cells distad of the triangle. Antenodals in the subcostal spaces and the cubito-anal cross-vein on all the wings, and the angles of the triangle and a few cross-veins distal to the triangle on the hind wings, dotted with brown.

♂. Frons anteriorly and superiorly (but not laterally) and the vertex dark metallic-blue; lips mostly blackish; thorax dark brown, sides paler, obscure; abdomen pale yellowish, a mid-dorsal and a lateral brown or black longitudinal stripe, the laterals beginning at the hind end of segment 3.

<sup>36</sup>This proposed name refers to the fact that the genus, although similar in many ways to *Macrothemis*, differs, among others, in that the male femora are armed like those of female *Macrothemis*.

Superior appendages slender, convex in profile, a small inferior tooth at five-sixths' length, where the tapering to the acute apex begins. Inferior appendage nine-tenths as long as the superiors. Genitalia of the second abdominal segment similar to those of *Macrothemis musiva*, but the hamule still more slender.

Legs yellow, brownish below.

♀. Frons and vertex greenish, lips chiefly greenish, with some dark marks; thorax greenish-yellow, with a mid-dorsal dark brown band. Vulvar lamina not quite reaching the hind margin of 8, emarginate.

*Dimensions*: Abdomen ♂ 16.5, ♀ 15.5; hind wing ♂ ♀ 20 mm.

*Habitat*: — BRAZIL, Chapada, by H. H. Smith, 3 ♂ and parts of 15 others; parts of 4 ♀, nos. 131 and 66; Rio Sapon, January 30, 1908, by J. D. Haseman, 1 ♀. Carnegie Museum, Pittsburgh.

#### 202. *Miathyria marcella* Selys.

*Miathyria marcella*, Calvert, Biol. Centr.-Amer. Neurop., pp. 294, 407. 1906, 1908.

*Habitat*: — COLOMBIA, Bonda, 2 ♀. H. H. Smith.

BRAZIL, Barreiras, January 4, 1908, 1 ♀, and Campo Largo, December 31, 1907, in Bahia, by J. D. Haseman.

Chapada, 17 ♂, 5 ♀; Cachoeira, 1 spmn. broken. Corumbá, May, 1 ♂, 1 ♀; Rio Grande do Sul, 1 ♂, 1 ♀; by H. H. Smith.

All the preceding in the Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, by W. T. Foster, November, 1899, January and March, 1903, 9 ♂, 9 ♀. U. S. National Museum.

Concepcion, December 31, 1 broken spmn.

ARGENTINA, Goya, Rio Paraná, east side, December 22, 1 ♂, 3 ♀.

?Fazenda de San Jose, Bananol, Grande Channel, near San Lourenso, January 8, 1 ♀.

The last six specimens by H. H. Smith, Carnegie Museum, Pittsburgh.

#### 203. *Miathyria simplex* Rambur.

*Miathyria simplex* Calv., Biol. Centr.-Amer. Neurop., p. 295. 1906.

*Habitat*: — BRAZIL, Corumbá, April, by H. H. Smith, 1 ♀. Carnegie Museum, Pittsburgh.

#### 204. *Tauriphila risi* Martin.

*Tauriphila risi* Martin, Boll. Mus. Zoöl. Torino, no. 239, p. 1. 1896.

Ris, Hamburg. Magal. Sammelr. Odon., p. 32. 1904.

*Habitat*: — BRAZIL, Rio Grande do Sul by H. v. Ihering, 3 ♂, 1 ♀. Academy of Natural Sciences of Philadelphia.

Same locality, 2 ♂, 1 ♀, by H. H. Smith.

PARAGUAY, Rio Parana [? Paraguay] above Rosario, December 19, in cop. 1 ♂, 1 ♀, by H. H. Smith.

Sapucay, December, 1899, by W. T. Foster, 5 ♀. U. S. National Museum.

ARGENTINA, Goya, Rio Parana, east side, December 22, by H. H. Smith, 4 ♂, 3 ♀.

The specimens collected by H. H. Smith, are in the Carnegie Museum, Pittsburgh.

#### 205. *Tauriphila australis* Hagen.

*Tauriphila australis* Calvert, Biol. Centr.-Amer. Neurop., p. 297, pl. ix, figs. 46, 47. 1906.

*Habitat*:—COLOMBIA, Bonda, November, 1 ♀, December, 1 ♂, by H. H. Smith. Carnegie Museum, Pittsburgh.

#### 206. *Tauriphila argo* Hagen.

*Tauriphila argo* Calv., Biol. Centr.-Amer. Neurop., p. 299, pl. ix, figs. 48, 49, 1906.

*Habitat*:—BOLIVIA, Piedra Blanca, April, 1 ♂.

PARAGUAY, Sapucay, November, 1899, 1 ♂, 4 ♀, December, 1 ♀, by W. T. Foster. U. S. National Museum.

ARGENTINA, Rio Parana just below Corrientes, December 23, 1 ♂. This and the Bolivian specimen by H. H. Smith, Carnegie Museum, Pittsburgh.

#### Genus TRAMEA.

The first four forms have been separated as follows, without presuming to decide whether all are entitled to specific rank. These four fall under Section I of the Synopsis in Biologia Centrali Americana, Neurop., p. 300. Abdominal segments 8 + 9 + 10 measure 5–5.5 mm. long, the inferior appendage of the males 1.5 mm. in all (four?).

Dark (blackish-brown) basal coloring of the hind wings reaching back not quite to the hind margin, but 8.5–10 mm. behind the cubital vein, with no clearer area between this band and the proximal (or anal) wing-margin. Superior appendages ♂ 5 mm. long. Hamule recumbent on genital lobe, projecting beyond it by less than the vertical half of the latter. Frons ♂ superiorly metallic-violet.

*brasiliانا.*

Dark brown basal coloring of hind wing reaching back not quite to the hind margin, 10–11 mm. behind Cu, with a clearer area between it and the proximal wing-margin. Superior appendages ♂ 3.5 mm. Hamule projecting beyond the genital lobe by less than half the vertical height of the lobes. Frons ♂ superiorly metallic-violet. . . . . *longicauda*, var.

Dark brown basal coloring of the hind wings reaching back to more than half the width of the wing, 7 mm. behind Cu, with a clear area between at least its hind half and the proximal wing-margin. Superior appendages ♂ ?, ♀ 3.5 mm. Hamule as in *brasiliانا*. Frons ♂ superior metallic-violet, ♂ yellow with basal superior metallic-blue stripe, 7 mm. wide. . . . . *binotata*.

Dark brown basal coloring of hind wing reaching back to half the width of the wing, 5 mm. behind Cu, with a clearer area between it and the proximal wing-margin. Appendages ♀ 3.5 mm. Vulvar lamina reaching to seven-eighths, or to the hind end, of the lateral margin of segment 9. Frons ♀ yellow or greenish yellow, a superior basal metallic-blue stripe .5 mm. wide. . . . . *subbinotata*.

207. ***Tramea brasiliانا*** Brauer.

*Habitat*:—BRAZIL, Minas Geraes 1 ♂, Museum, of Comparative Zoölogy, Cambridge, Mass.

Sete Lagoas in Minas Geraes, May 3, 1908, by J. D. Haseman, 1 ♂.

Chapada?, by H. H. Smith, 2 ♂, no. 38. Carnegie Museum, Pittsburgh.

208. ***Tramea longicauda*** Brauer var. ?

*Habitat*:—BRAZIL, Sete Lagoas in Minas Geraes, May 7, 1908, by J. D. Haseman, 1 ♂.

Rio Grande do Sul, 2 ♂; Cuyabá, 1 ♂; Corumbá, May, 2 ♂.

BOLIVIA, Piedra Blanca, April, 1 ♂.

The six specimens by H. H. Smith. Carnegie Museum, Pittsburgh.

209. ***Tramea binotata*** Rambur.

Two males in the Museum of Comparative Zoölogy, Cambridge, Mass., without locality labels, one of them labeled “*L. binotata*” in de Selys’ hand, and “Cl” [= ? Claussen and hence Minas Geraes?].

PARAGUAY, Sapucay, by W. T. Foster, March 9, 1903, 1 ♀. U. S. National Museum.

210. ***Tramea subbinotata*** Brauer.

*Habitat*:—BRAZIL, 1 ♀ by Heyer, Museum of Comparative Zoölogy, Mass.

ARGENTINA, Goya, Rio Paraná, east side, December 22, by H. H. Smith, 1 ♀. Carnegie Museum, Pittsburgh.

211. ***Tramea cophysa* ?** Hagen.

*Tramea cophysa* ? Calvert, Biol. Centr.-Amer. Neurop., p. 301. 1906.

*Habitat*:—COLOMBIA, Bonda, July, 1 ♂, 7 ♀, August, 3 ♂, 7 ♀, October, 2 ♀, November, 2 ♀.

BRAZIL, Chapada, 7 ♂, 3 ♀, no. 130.

All by H. H. Smith. Carnegie Museum, Pittsburgh.

**212. *Tramea insularis* Hagen.**

*Tramea insularis*, Calvert, Biol. Centr.-Amer. Neurop., p. 303. 1906.

*Habitat*:—BAHAMAS, Andros Island, Mangrove Cay, July 31, 1904, by O. Bryant, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

**213. *Tramea onusta* Hagen.**

*Tramea onusta* Calvert, Biol. Centr.-Amer. Neurop., p. 305. 1906.

*Habitat*:—BAHAMAS, Andros Island, Mangrove Cay, August, 1904, by Allen, Barbour, and Bryant, 1 ♂. Museum of Comparative Zoölogy, Cambridge, Mass.

**214. *Pantala flavescens* Fabr.**

*Pantala flavescens* Calv., Biol. Centr.-Amer. Neurop. pp. 307, 407. 1906, 1908.

*Habitat*:—COLOMBIA, Bonda, July, 3 ♂, 1 ♀; August, 4 ♂, 3 ♀, September, 1 ♂; Onaca, August, 1 ♀.

BRAZIL, Rio Grande do Sul, 1 ♀.

All by H. H. Smith. Carnegie Museum, Pittsburgh.

São Paulo, September 7, 1900, by A. Hempel. Academy of Natural Sciences of Phila.

BOLIVIA, near Coroico, June 4 and 6, 1899, by W. J. Gerhard, 2 ♂. Academy of Natural Sciences of Philadelphia.

PARAGUAY, Sapucay, November, 1899, by W. T. Foster, 1 ♂. U. S. National Museum.

**215. *Pantala hymenæa* Say.**

*Pantala hymenæa* Calv., Biol. Centr.-Amer. Neurop. pp. 309, 407. 1907, 1908.

*Habitat*:—COLOMBIA, Bonda, by H. H. Smith, 1 ♂.

BRAZIL, Barreiras in Bahia, January 4, 1908, by J. D. Haseman, 1 ♂. Carnegie Museum, Pittsburgh.

**216. *Diastatops pullata* Burmeister.**

*Habitat*:—BRAZIL, Cachoeira, 1 ♂, no. 29; Cachoeira Cuyabá Lagoa, January 29, 1 ♂; both by H. H. Smith. Carnegie Museum, Pittsburgh.

**217. *Diastatops fuliginea* Rambur.**

*Habitat*:—BRAZIL, Boqueirão in Bahia, near the junction of Rio Preto and Rio Grande, January 7, 1908, by J. D. Haseman, 1 ♂, 1 ♀. Carnegie Museum, Pittsburgh.



218. **Diastatops tincta** Rambur.

*Habitat*:—BRAZIL, Uacaryzal, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

219. **Perithemis thais** Kirby.

*Habitat*:—PERU, Iquitos, Staudinger, 2 ♂.

BRAZIL, Para? 1 ♂.

Museum of Comparative Zoölogy, Cambridge, Mass.

PARAGUAY, Sapucay, March, 1900, by W. T. Foster, 2 ♂. U. S. National Museum.

220. **Perithemis domitia iris** Hagen.

*Perithemis domitia iris* Calvert, Biol. Centr.-Amer. Neurop., p. 313, 408. 1907  
1908.

*Habitat*:—COLOMBIA, Bonda, August, 1 ♂, by H. H. Smith, Carnegie Museum, Pittsburgh.

PARAGUAY: Sapucay, November, 1899, 1 ♂, January, 1903, 8 ♂, February, 1900, 1 ♀, by W. T. Foster. U. S. National Museum.

221. **Perithemis domitia mooma** Kirby.

*Perithemis domitia mooma*, Calv., l. c., p. 314. 1907.

*Habitat*:—VENEZUELA, La Guaira, July 27, 1900, by Lyon & Robinson, 1 ♂. U. S. National Museum.

BRAZIL, Barreiras, January 4, 1 ♀, and Campo Largo, January 1, 1908, 1 ♀, in Bahia, by J. D. Haseman. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, March, 1900, by W. T. Foster, 1 ♀. U. S. National Museum.

222. **Rhodopygia hollandi** Calvert.

(PLATE IX, FIG. 148.)

*Rhodopygia hollandi* Calvert, Biol. Centr.-Amer. Neurop., pp. 319, pl. ix, fig. 54. 1907.

*Habitat*:—BRAZIL, Chapada, 7 ♂, 4 ♀ (parts); Cachoeira, 1 ♂, no. 40; Cuyabá, January, 1886, lakes, 3 ♂, 1 ♀; by H. H. Smith. Carnegie Museum, Pittsburgh.

223. **Cannacria furcata** Hagen.

*Cannacria furcata* Calv., l. c., p. 325. 1907.

*Habitat*:—BRAZIL, Sete Lagoas in Minas Geraes, May 8, 1908, by J. D. Haseman, 1 ♂.

Rio de Janeiro, November, 1 ♀, January, 2 ♂, 3 ♀.

ARGENTINA, Santa Helena, December 21, 1 ♀, and Goya, December 22, 1 ♀, both east side Rio Paraná.

H. H. Smith. Carnegie Museum, Pittsburgh.

224. **Cannacria batesi** Kirby.

*Cannacria batesi* Calv., l. c., p. 326. 1907.

*Habitat*: — BRAZIL, Campo Largo in Bahia, January 1, 1908, by J. D. Haseman, 1 ♂, 1 ♀.

Chapada, December, 1 ♂, 1 ♀.

BOLIVIA, Piedra Blanca, April, 1 ♂.

The last three by H. H. Smith. All in the Carnegie Museum, Pittsburgh.

225. **Erythemis peruviana** Rambur.

*Erythemis peruviana* Calv., l. c., p. 333. 1907.

*Habitat*: — COLOMBIA, Bonda, October, 1 ♂, by H. H. Smith.

BRAZIL, Barreiras in Bahia, January 4, 1908, by J. D. Haseman, 3 ♂, 1 ♀.

Cuyabá, January, 1886, lakes, 3 ♂, 1 ♀; Cachoeira, 1 ♂, 1 ♀; Uacaryzal, February, 1 ♂, 1 ♀, by H. H. Smith.

Santa Anna do Japara, August 20, by Moenkhaus, 1 ♀. Collection of C. C. Adams.

PARAGUAY, Rio Paraguay, below Concepcion, "December 28, clay beach fronting lowland forest, very abundant," 1 ♂, 1 ♀, December 31, 1 ♂, by H. H. Smith.

The preceding, except that from Santa Anna, etc., in the Carnegie Museum, Pittsburgh.

Sapucay, December, 1899, and January, 1900, by W. T. Foster, 2 ♀. U. S. National Museum.

226. **Erythemis mithroides** Brauer.

*Erythemis mithroides* Calv., l. c., p. 334. 1907.

*Habitat*: — PARAGUAY, Concepcion, December 31, by H. H. Smith, 2 ♂. Carnegie Museum, Pittsburgh.

227. **Erythemis attala** Selys.

*Erythemis attala* Calv., l. c., p. 335. 1907.

*Habitat*: — BRAZIL, Santa Anna do Japara, August, 1898, by Moenkhaus, 3 ♂, 1 ♀. Collection of C. C. Adams.

Cachoeira Cuyaba, January 27, by H. H. Smith, 1 ♂. Carnegie Museum, Pittsburgh.

PARAGUAY, Sapucay, January, 1900, by W. T. Foster, 1 ♂. U. S. National Museum.

228. *Erythemis verbenata* Hagen.*Erythemis verbenata* Calv., *l. c.*, p. 336. 1907.*Habitat*: — COLOMBIA, Bonda, October, 1 ♂, November, 3 ♂, 1 ♀, December, 1 ♂, by H. H. Smith.

BRAZIL, Bosqueiraõ in Bahia, January 7, 1908, by J. D. Haseman, 1 ♂.

Rio Janeiro, November, 1 ♀, January, 1 ♂; Corumbá, May, 3 ♀; Uacaryzal, 1 ♀; by H. H. Smith.

PARAGUAY, below Asuncion, December 24, 1 ♂, by H. H. Smith.

All the preceding in the Carnegie Museum, Pittsburgh.

Sapucay, March, 1900, by W. T. Foster, 1 ♂. U. S. National Museum.

229. *Erythemis hæmatogastra* Burmeister.

(PLATE IX, FIG. 154.)

*Erythemis hæmatogastra* Calv., *l. c.*, p. 338. 1907.*Habitat*: — BRAZIL, Rio Grande above the mouth of Rio Preto in Bahia, December 30, 1907, by J. D. Haseman, 1 ♀.

Cachoeira Cuyabá, January 27, 1 ♂; Cuyabá, 1 ♂; Uacaryzal, February, 1 ♂; by H. H. Smith.

PARAGUAY, Rio Paraguay beyond Concepcion, forest shore, December 28, 1 ♀, by H. H. Smith. Carnegie Museum, Pittsburgh.

230. *Erythemis credula* Hagen.*Erythemis credula* Calv., *l. c.*, p. 339. 1907.*Habitat*: — BRAZIL, Cuyabá, 1 ♀; Cachoeira, 1 ♂, 1 ♀; Uacaryzal, 2 ♂, 2 ♀; Corumbá, April, 1 ♂.

BOLIVIA, Piedra Blanca, April, 1 ♂.

All by H. H. Smith. Carnegie Museum, Pittsburgh.

231. *Lepthemis vesiculosa* Fabricius.*Lepthemis vesiculosa* Calv., *l. c.*, p. 339. 1907.*Habitat*: — COLOMBIA, Bonda, August, 2 ♂, 1 ♀, October, 2 ♂, November, 2 ♀, by H. H. Smith.

BRAZIL, Campo Largo in Bahia, December 31, 1907, by J. D. Haseman, 2 ♂.

Chapada, December, by H. H. Smith, 1 ♂.

The preceding in the Carnegie Museum, Pittsburgh.

Santa Anna do Japara, August, 1898, by Moenkhaus, 1 ♀. Collection of C. C. Adams.

PARAGUAY, Sapucay, by W. T. Foster, February and March, 1900, by W. T. Foster, 2 ♂. U. S. National Museum.

## EXPLANATION OF PLATES.

(All the figures on Plates 1-7 have been drawn with the aid of the drawing camera by the author. Figs. 1-4, 17-43 are on the same scale; 6-16 are on the same scale; 44-124 are on the same scale; 125-127 are on the same scale; 128, 129, 131-133 are on the same scale; 130, 134-138 are on the same scale.)

## PLATE I.

FIGS. 1, 2. *Heterina fuscibasis*, sp. nov., ♂. Chapada, abdominal appendages. 1, supero-internal-oblique view, left appendages. 2, profile view of the same.

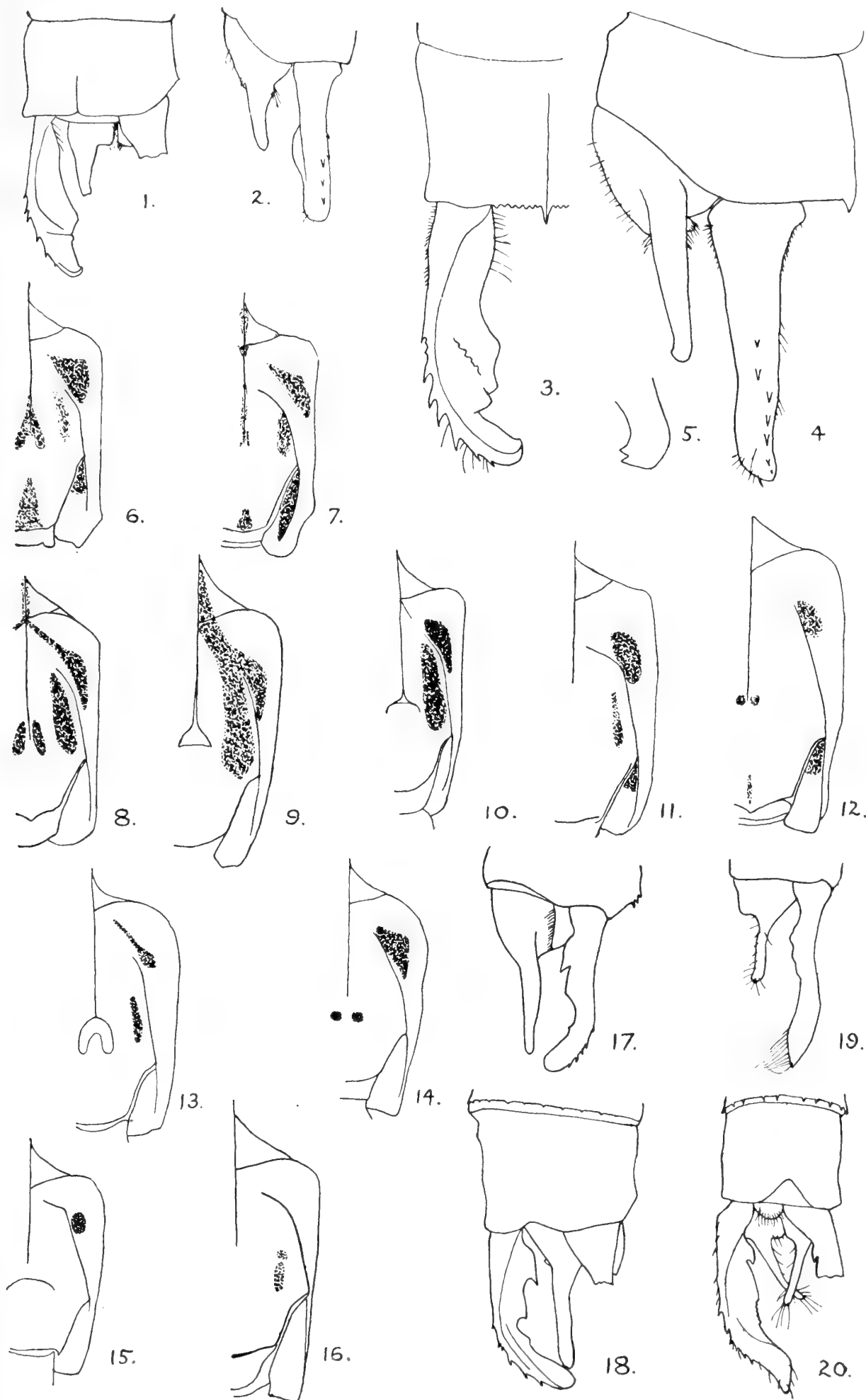
FIGS. 3, 4, 5. *Heterina charca*, sp. nov., ♂. Chulumani, Bolivia, Nov. 30, 1898. 3, left superior abdominal appendage, dorsal view. 4, profile view, left appendages. 5, inner ventral view, apex of left inferior appendage.

FIGS. 6-16. Pectoral color-patterns of species of *Lestes*; the left side only is shown.

6. *Lestes scalaris*, sp. nov., ♂, Cuba.
7. *Lestes spumarius*, Selys, ♂, Cuba.
8. *Lestes dichrostigma*, sp. nov., ♂, São Paulo.
9. *Lestes tricolor* Erichson, ♂, Bahia?
10. *Lestes mediorufus*, sp. nov., ♂, São Paulo.
11. *Lestes pictus* Hagen, ♂, Brazil.
12. *Lestes tenuatus* Rambur, ♂, Don Diego, Colombia.
13. *Lestes quadristriatus*, sp. nov., ♂, Chapada.
14. *Lestes paulistus*, sp. nov., ♂, São Paulo.
15. *Lestes bipupillatus* sp. nov., ♀, Chapada.
16. *Lestes undulatus* Say, ♂, Penco, Chile.

FIGS. 17, 18. *Lestes scalaris*, sp. nov., ♂, Cuba, by Gundlach, 1866. 17, profile view left abdominal appendages; 18, supero-internal oblique view of the same.

FIGS. 19, 20. *Lestes spumarius* Selys, ♂, Cuba. 19, profile view, left abdominal appendages; 20, supero-internal oblique view of the same.



Hetærina and Lestes.





## PLATE II.

FIGS. 21, 22. *Lestes bipupillatus*, sp. nov., ♂, Chapada, Brazil. 21, profile view, left appendages; 22, supero-internal oblique view of the same.

FIGS. 23, 24. *Lestes mediorufus*, sp. nov., ♂, São Paulo, September 14, 1900. 23, profile view, left appendages; 24, supero-internal oblique view of the same.

FIGS. 25, 26. *Lestes paulistus*, sp. nov., ♂, São Paulo, September 14, 1900. 25, profile view, left abdominal appendages; 26, dorsal view of appendages.

FIGS. 27, 28. *Lestes pictus* Hagen, ♂, type, Brazil, by Fischer. 27, profile view, left appendages; 28, supero-internal oblique view of same.

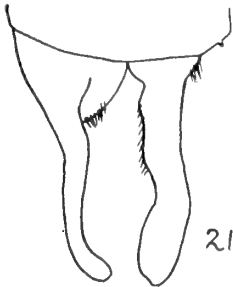
FIGS. 29, 30. *Lestes tricolor* Erichson, ♂, type, Bahia. 29, profile view, left appendages; 30, dorsal view of appendages.

FIGS. 31, 32. *Lestes dichrostigma*, sp. nov., ♂, São Paulo, September 14, 1900. 31, profile view, left appendages; 32, dorsal view of appendages.

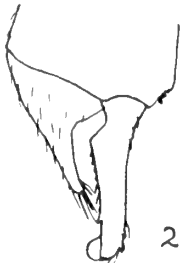
FIGS. 33, 34. *Lestes undulatus* Say, ♂, Penco, Chile, January, 1905. 33, profile view, left appendages; 34, dorsal view of appendages.

FIGS. 35, 36. *Lestes quadristriatus*, sp. nov., ♂, Chapada, Brazil. 35, profile view, left superior appendage; 36, supero-oblique view, superior appendages from the right.





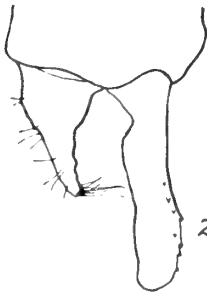
21.



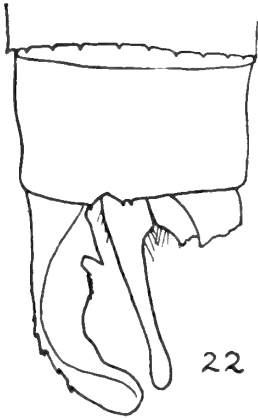
23.



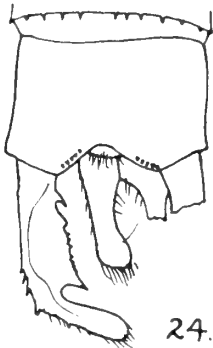
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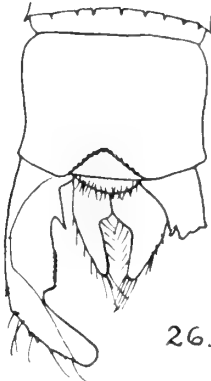
27



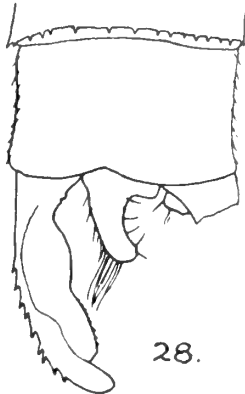
22



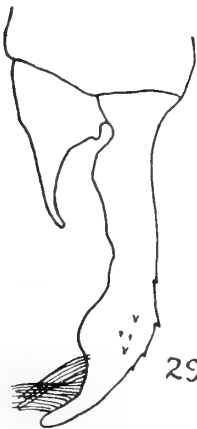
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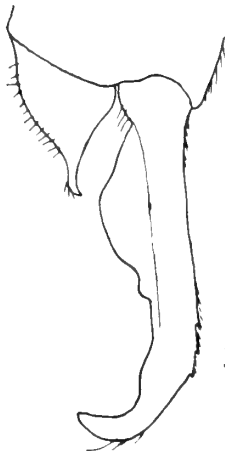
26.



28.



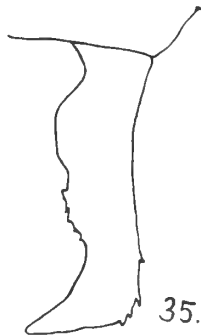
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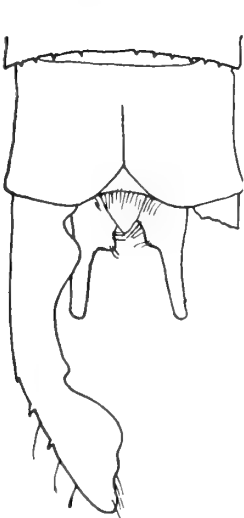
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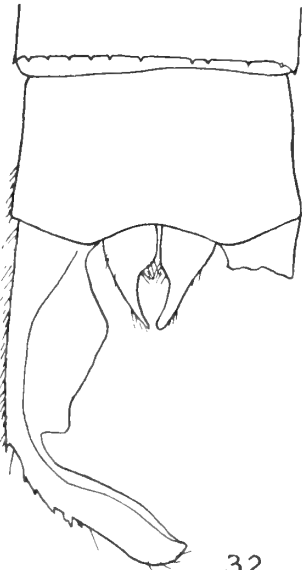
33



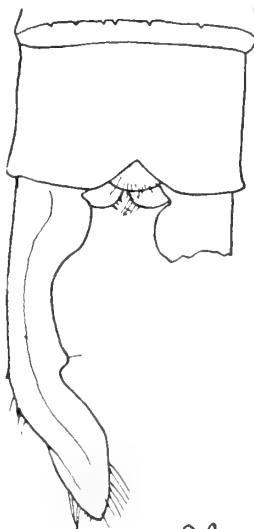
35.



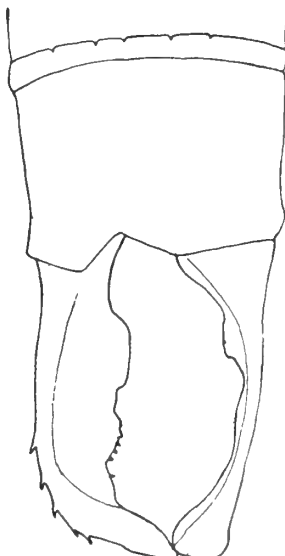
30.



32.



34.



36.

Lestes.





## PLATE III.

FIGS. 37-42. Supero-internal oblique views of the right abdominal appendages of males of species of *Heteragrion*.

37. *Heteragrion æquatoriale* Selys, ♂, Piches and Perene valleys, Peru.

38. *Heteragrion inca*, sp. nov., ♂, Iquitos, Peru.

39. *Heteragrion triangulare* Hagen, ♂, Chapada, Brazil.

40. *Heteragrion aurantiacum* Selys, ♂, Rio de Janeiro.

41. *Heteragrion flavidorsum*, sp. nov., ♂, nine miles from Coroico, Bolivia, May 19, 1899.

42, 43. *Heteragrion angustipenne* Selys, ♂, Cumbase, Peru. 43, profile view, left appendages.

FIGS. 44, 45. *Perilestes fragilis*? Hagen, ♂, Chapada, Brazil. 44, supero-internal oblique view of right superior appendage; 45, internal view of same from slightly above.

FIG. 46. *Perilestes cornutus*? Selys, ♂, Surubres, Costa Rica, similar to fig. 45; damaged.

FIGS. 47, 48. *Oxyagrion divaricatum*, sp. nov., ♂, Chapada, Brazil. 47, dorsal, and 48, left profile view of abdominal appendages.

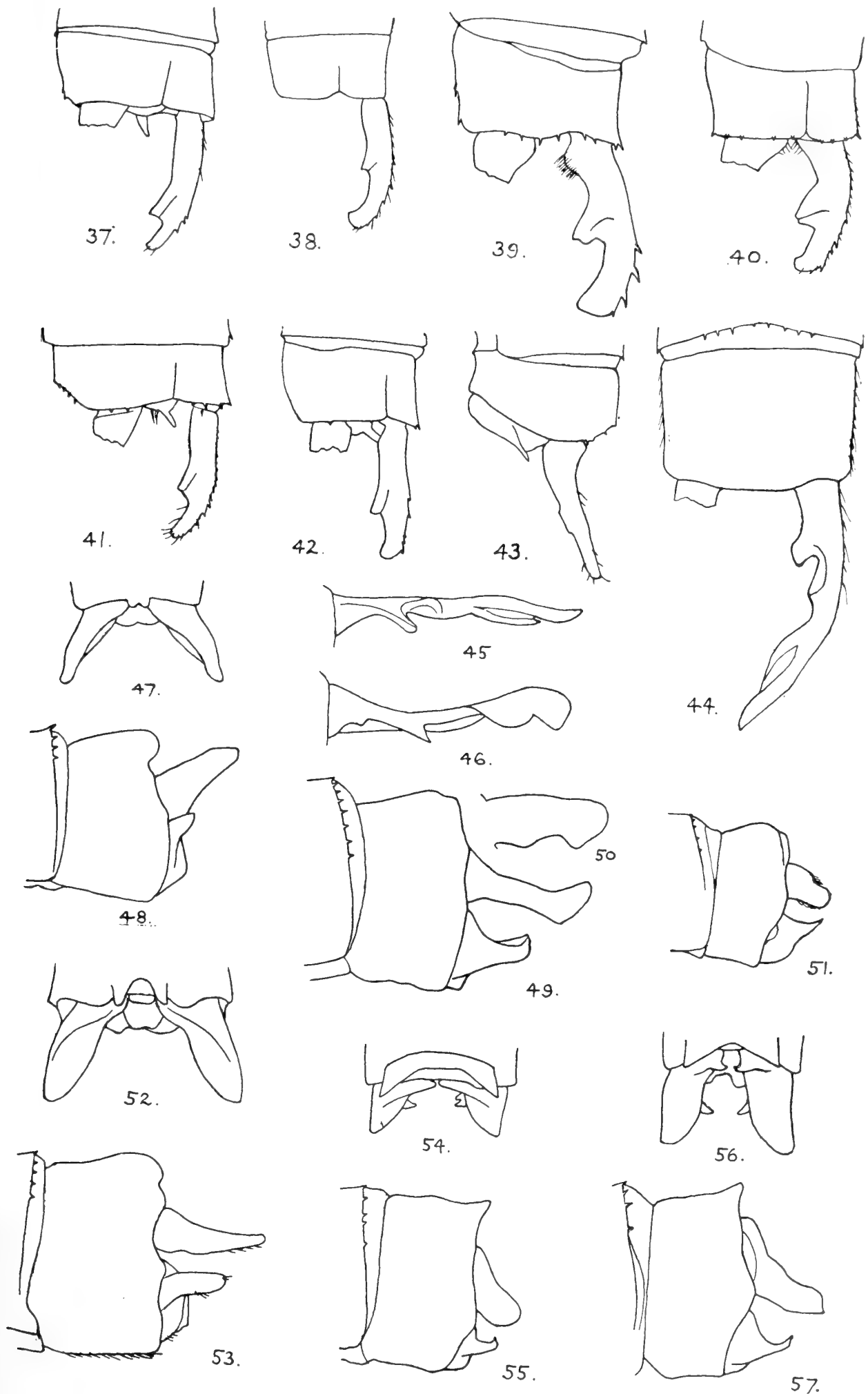
FIGS. 49, 50. *Oxyagrion rufulum* Hagen, ♂, Quillota, Chile. 49, left profile view of appendages; 50, supero-internal view, right superior appendage.

FIG. 51. *Oxyagrion evanescens*, sp. nov., ♂, Chapada, Brazil. Left profile view, abdominal apex.

FIGS. 52, 53. *Oxyagrion hempeli*, sp. nov., ♂, São Paulo. 52, dorsal, and 53, left profile view of abdominal appendages.

FIGS. 54, 55. *Oxyagrion basale* Selys, ♂, Chapada, Brazil; similar to the preceding.

FIGS. 56, 57. *Oxyagrion impunctatum*, sp. nov., ♂, Chapada, Brazil; similar to the preceding.



Heteragrion, Perilestes, and Oxyagrion.





## PLATE IV.

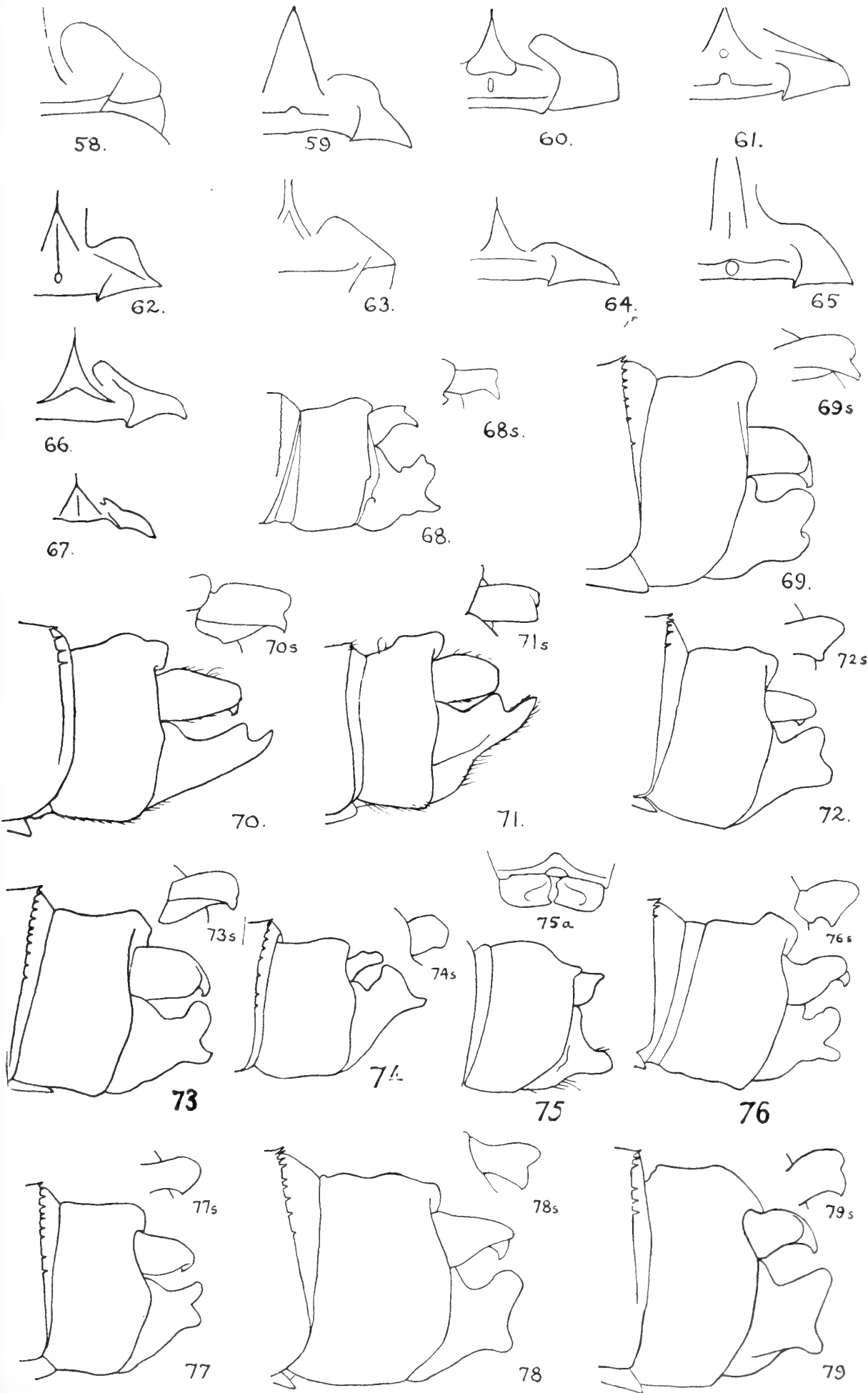
FIGS. 58-67. Left mesostigmal lamina of females of species of *Argia* and *Diargia*, viewed from in front.

- 58. *Argia fosteri*, sp. nov., ♀. Sapucay.
- 59. *Argia hasemani*, sp. nov., ♀, Bom Fim.
- 60. *Argia gerhardi*, sp. nov., ♀, Chulumani, Bolivia.
- 61. *Argia mollis* Hagen, ♀, Chapada.
- 62. *Argia tinctipennis* Selys, ♀, Peixe-Boi, Brazil.
- 63. *Argia botacudo*, sp. nov., ♀, Chapada.
- 64. *Argia smithiana*, sp. nov., ♀, Chapada.
- 65. *Argia iralai*, sp. nov., ♀, Sapucay.
- 66. *Argia reclusa* Selys, ♀, Chapada.
- 67. *Diargia bicellulata*, sp. nov., ♀, Chapada.

FIGS. 68-79. Left profile view of apex of abdomen of males of species of *Diargia* and *Argia*; 68s-79s, supero-internal oblique views of the right superior appendage of the same.

- 68, 68s. *Diargia bicellulata* sp. nov., ♂, Chapada.
- 69, 69s. *Argia fosteri*, sp. nov., ♂, Sapucay, November, 1899.
- 70, 70s. *Argia gerhardi*, sp. nov., ♂, Chulumani.
- 71, 71s. *Argia kokama*, sp. nov., ♂, Iquitos.
- 72, 72s. *Argia hasemani*, sp. nov., ♂, Bom Fim, Nov. 20, 1907.
- 73, 73s. *Argia tamoyo*, sp. nov., ♂, Chapada.
- 74, 74s. *Argia smithiana*, sp. nov., ♂, Chapada.
- 75. *Argia thisma*, sp. nov., ♂, Chapada. 75a, dorsal view of superior appendages of the same.
- 76, 76s. *Argia chapadae*, sp. nov., ♂, Chapada.
- 77, 77s. *Argia botacudo*, sp. nov., ♂, Chapada.
- 78, 78s. *Argia tupi*, sp. nov., ♂, Chapada.
- 79, 79s. *Argia subapicalis*, sp. nov., ♂, Chapada.





Argia and Diargia.





## PLATE V.

FIG. 80. *Acanthagrion gracile ablutum*, subsp. nov., ♂, near Coroico, May 2, 1899. Left profile view, apex of abdomen.

FIG. 81. *Acanthagrion gracile ascendens*, subsp. nov., ♂, Cachoeira, same. 81a, outline of upper part of abd. seg. 10, rear view.

FIGS. 82, 82a. *Acanthagrion apicale*, Selys. ♂, Iquitos. As in the preceding.

FIG. 83. *Acanthagrion cuyabæ freirense*, subsp. nov., ♂, Muniz Freire. Left profile view, apex of abdomen.

FIG. 84. *Acanthagrion cuyabæ fimense*, subsp. nov., ♂, Bom Fim. Same.

FIGS. 85, 86. *Acanthagrion cuyabæ*, sp. nov., ♂, Cuyabá. 85, dorsal view of superior appendages; 86, left profile view, apex of abdomen.

FIG. 87. *Acanthagrion truncatum* Selys, ♂, Chapada. Left profile view, apex of abdomen.

FIGS. 88, 89. *Acanthagrion chararum*, sp. nov., ♂, Cuyabá. 88, left profile view, apex of abdomen. 89, dorsal view of superior appendages.

FIGS. 90, 91. *Acanthagrion chacoense*, sp. nov., ♂, Piedra Blanca. 90, dorsal view of superior appendages; 91, left profile view, apex of abdomen.

FIG. 92. *Acanthagrion temporale* Selys. ♂, left profile view, apex of abdomen.

FIGS. 93, 94. *Acanthagrion chirihuanum*, sp. nov., Cuyabá. 93, left profile view, apex of abdomen; 94, dorsal view of appendages.

FIGS. 95, 96. *Skiallagma simulacrum*, sp. nov., ♂, Cuyabá. 95, dorsal view of appendages; 96, left profile view, apex of abdomen.

FIG. 97. *Acanthagrion ambiguum* Ris, ♀, Villeta. Hind margin of prothorax.

FIG. 98. *Acanthagrion cheliferum*, ♀, Santa Helena. Same.

FIG. 99. *Telebasis corallina* ♂, Bahia. Left profile view, apex of abdomen.

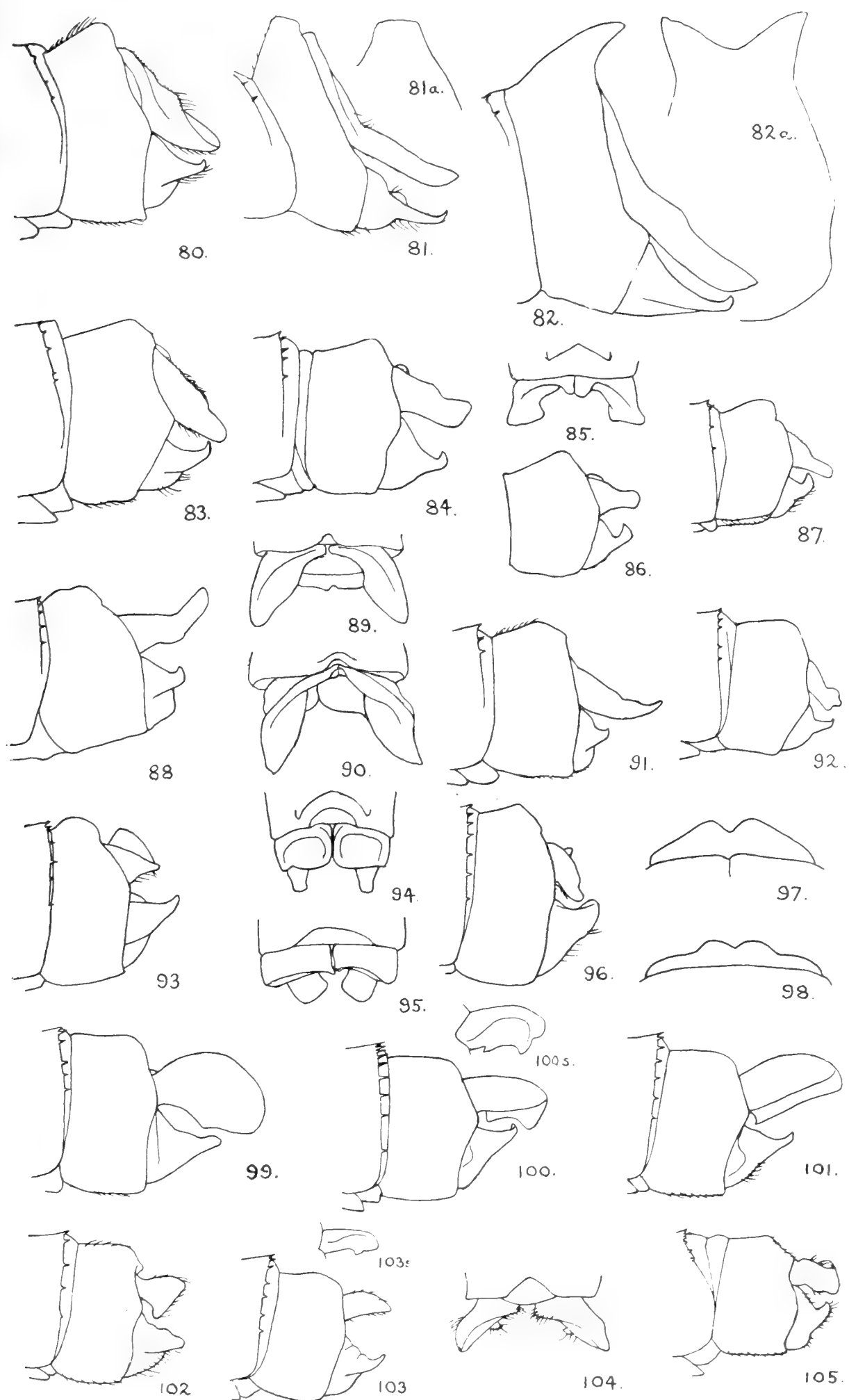
FIGS. 100, 100a. *Telebasis carmesina*, sp. nov., ♂, Sete Lagoas. 100 same as 99. 100s, inner surface, right superior appendage.

FIG. 101. *Telebasis sanguinalis*, sp. nov., ♂, Chapada. Same as 99.

FIG. 102. *Telebasis carminita*, sp. nov., ♂, Cuyabá. Same as 99.

FIGS. 103, 103s. *Telebasis coccinata*, sp. nov., ♂, Chapada. 103 same as 99; 103s, supero-internal view of right superior appendage.

FIGS. 104, 105. *Tigriagrion aurantinigrum*, sp. nov., ♂, Chapada. 104, dorsal view of appendages; 105, left profile view, apex of abdomen.



Acanthagrion, Skiallagma, Telebasis, and Tigriagrion.





## PLATE VI.

FIGS. 106, 107. *Metaleptobasis diceras*, Selys, ♂, Bahia. 106, left profile view hind prothoracic lobe and mesothoracic horn; 107, dorsal view of same.

FIGS. 108, 109. *Metaleptobasis bicornis*? Selys, ♂, Chapada. Like 106 and 107.

FIGS. 110, 111. *Metaleptobasis cornicauda*, sp. nov., ♂, Bahia. 110, left profile view, apex of abdomen; 111, dorsal view of appendages.

FIGS. 112, 113, 115-117. *Leptobasis mammilaris*, sp. nov., ♂, Chapada, ♀ Rio de Janeiro. 112, dorsal view of appendages ♂; 113, left profile view of apex of abdomen ♂; 115, like 106 and 108, ♂; 116, like 107 and 109, ♂; 117, hind prothoracic lobe, ♀, from in front.

FIG. 114. *Metaleptobasis diceras* Selys, ♂, Bahia. Left profile view, apex of abdomen.

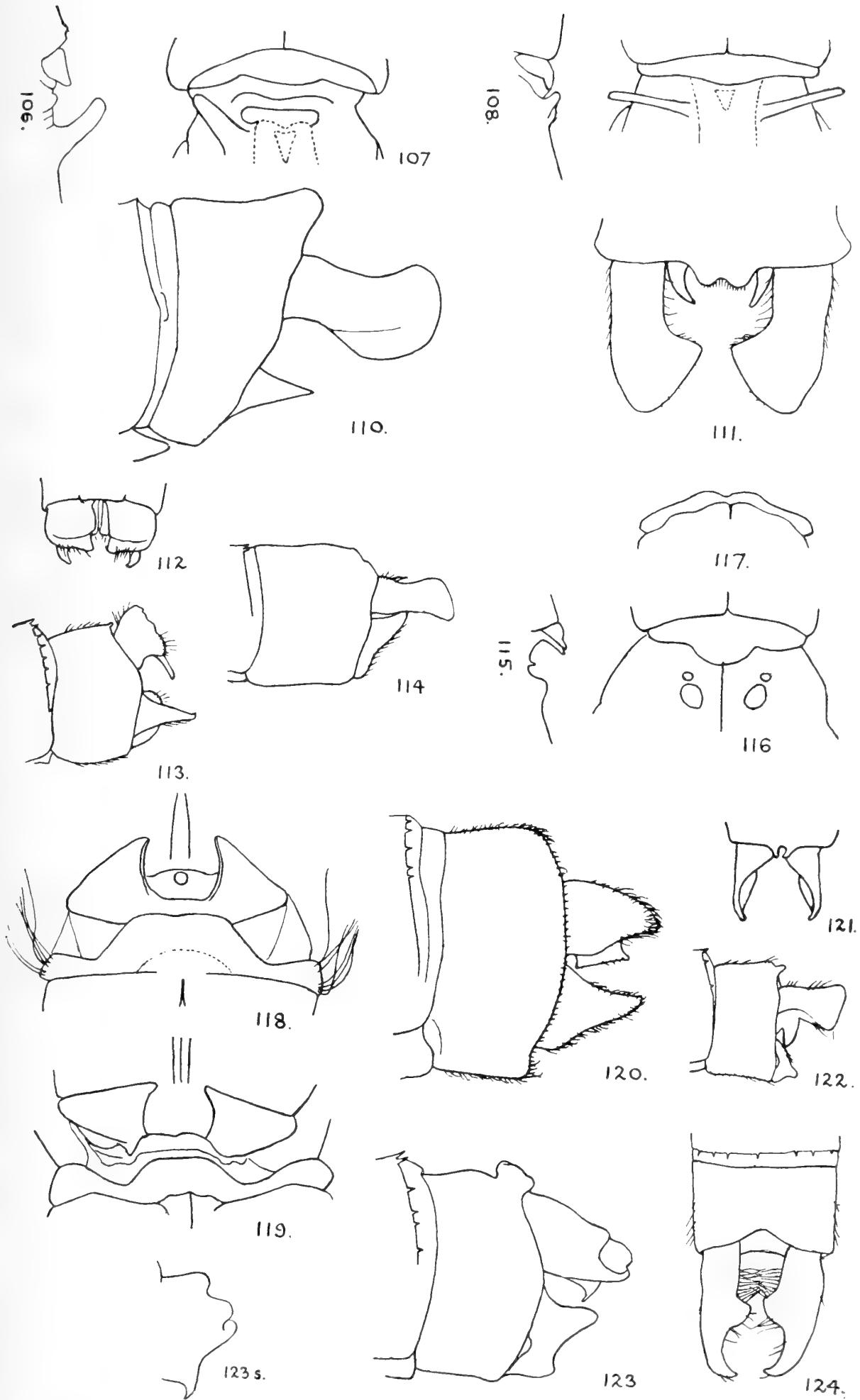
FIGS. 118-120. *Amphiagrion titicacæ*, sp. nov., Puno. 118, hind prothoracic lobe and mesostigmal laminæ from in front, ♂; 119, same, ♀; 120, left profile view, apex of abdomen, ♂.

FIGS. 121, 122. *Ischnura*? *nepos* Selys, ♂, Piedra Blanca. 121, dorsal view of appendages; 122, left profile view, apex of abdomen.

FIGS. 123, 123s. *Enallagma*? *ovigerum*, sp. nov., ♂, Sta. Fe de Bogota. 123, left profile view, apex of abdomen; 123s, inner surface of right superior appendage.

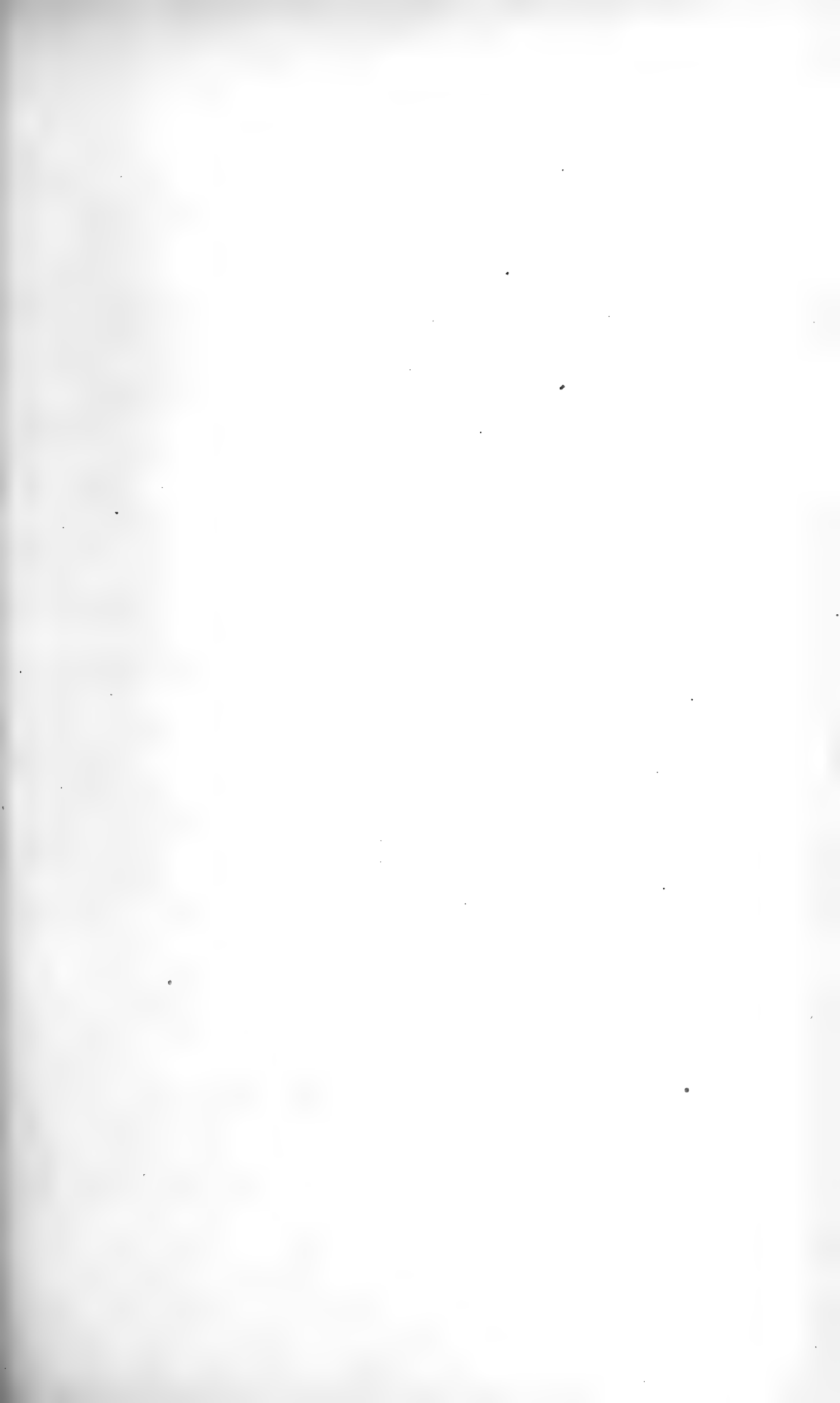
FIG. 124. *Peristicta æneoviridis*, sp. nov., ♂, Sapucay. Dorsal view, apex of abdomen.





Metaleptobasis, Amphiagrion, Ischnura, Enallagma, and Peristicta.





## PLATE VII.

FIG. 125. *Gomphoides hesperus*, sp. nov., ♂, Quevedo, Ecuador. Left profile view apical segments of abdomen. 125s, apex of one superior appendage viewed from above and behind, more highly magnified.

FIG. 126. *Gomphoides viridipleuris*, sp. nov., ♂. Sapucay, December, like 125. 126s, apex of left superior appendage in dorsal view, more highly magnified.

FIG. 127. *Gomphoides camposi*, sp. nov., ♂, Queredo, Ecuador; like 125.

FIG. 128. *Progomphus recticarinatus*, sp. nov., ♂, Chapada. Left profile view, apex of abdomen.

FIG. 129. *Progomphus intricatus* Selys, ♂, Chapada; like 128.

FIG. 130. *Micrathyria ocellata dentiens*, sp. nov., ♂, Bom Fim, Nov. 2; like 128.

FIG. 131. *Dorocordulia errans*, sp. nov., ♂, Chapada? like 128.

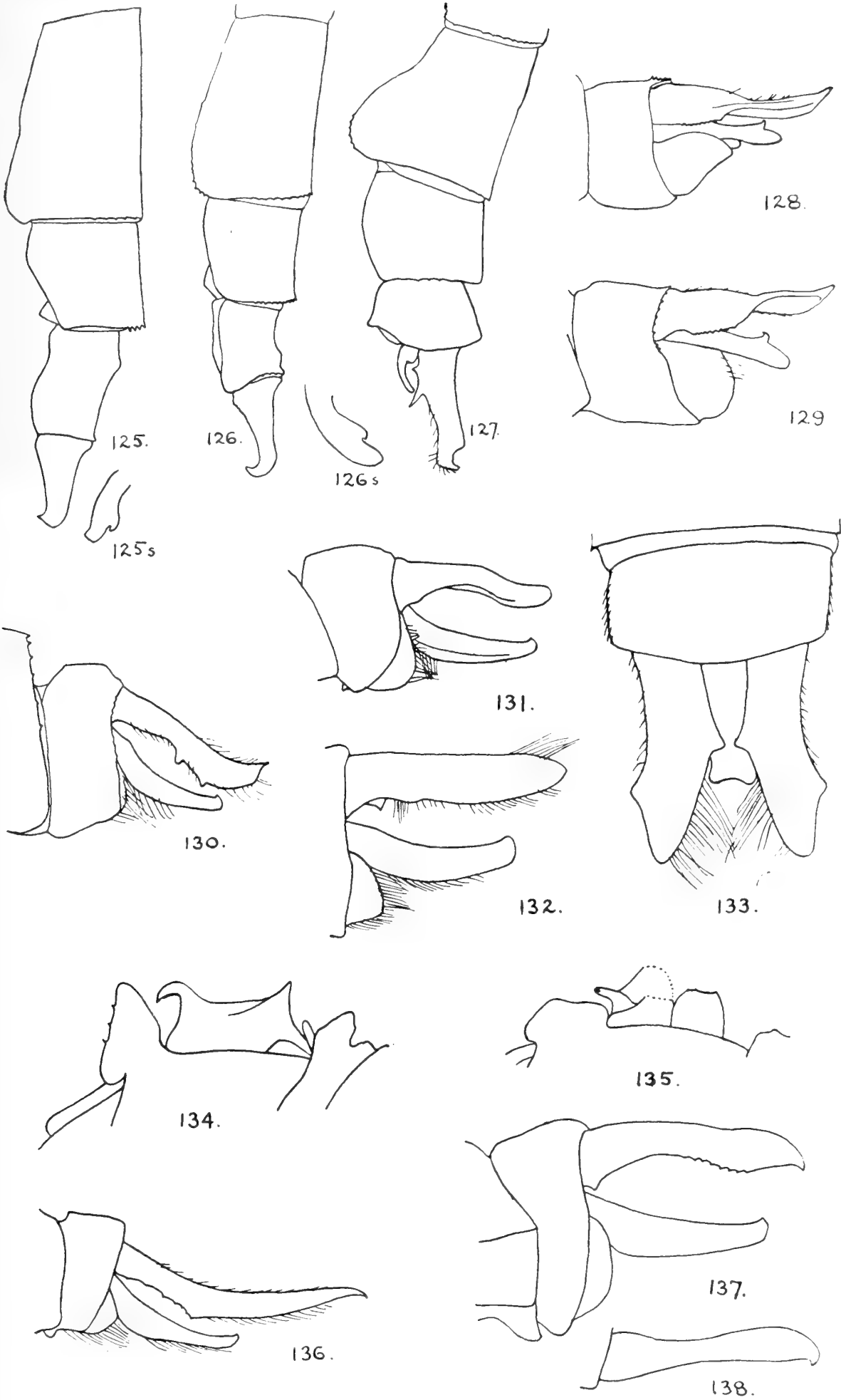
FIGS. 132, 133. *Neocordulia volxemi* Selys, ♂, Chapada. 132, left profile view of appendages; 133, dorsal view, apex of abdomen.

FIG. 134. *Micrathyria spinifera*, sp. nov., ♂, Surinam. Left profile view, genitalia of abdominal segment 2.

FIG. 135. *Micrathyria dythemoides*, sp. nov., ♂, Surinam; same as fig. 134. The hamules are broken as indicated by dotted lines.

FIG. 136. *Micrathyria macrocercis*, sp. nov., ♂, Cachoeira. Left profile view, apex of abdomen.

FIGS. 137, 138. *Macrothemis declivata*, sp. nov., ♂, Rio de Janeiro. 137, left profile view, apex of abdomen; 138, dorsal view, left superior appendage.



Gomphoides, Progomphus, Micrathyria, Dorocordulia, Neocordulia,  
and Macrothemis.



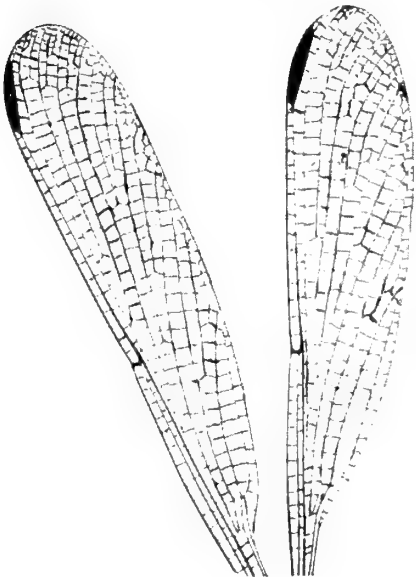


## PLATE VIII.

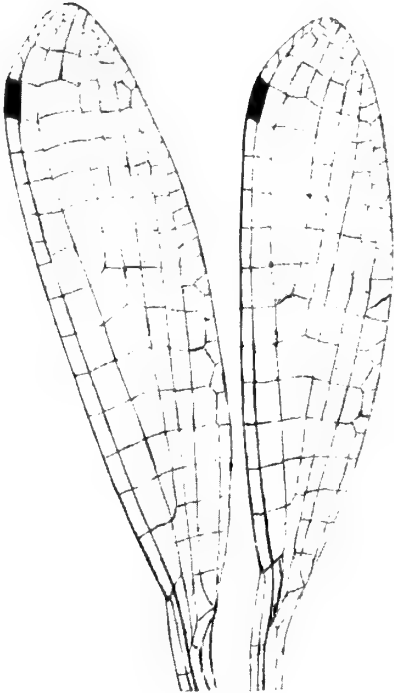
(Venation of Wings from Photographs by Dr. H. G. Kribs.)

- FIG. 139. *Heliocharis amazona*, Selys, ♂, Chapada.  
FIG. 140. *Perilestes fragilis*? Hagen, Chapada.  
FIG. 141. *Diargia bicellulata*, sp. nov., Chapada.  
FIG. 142. *Oyagrion evanescens*, sp. nov., Chapada.  
FIG. 143. *Tigriagrion aurantinigrum*, sp. nov., Chapada.  
FIG. 144. *Argia thisma*, sp. nov., Chapada.

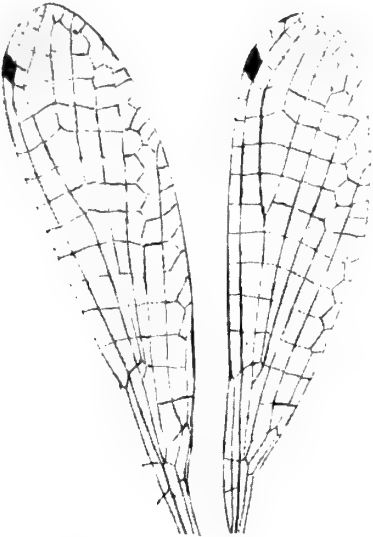




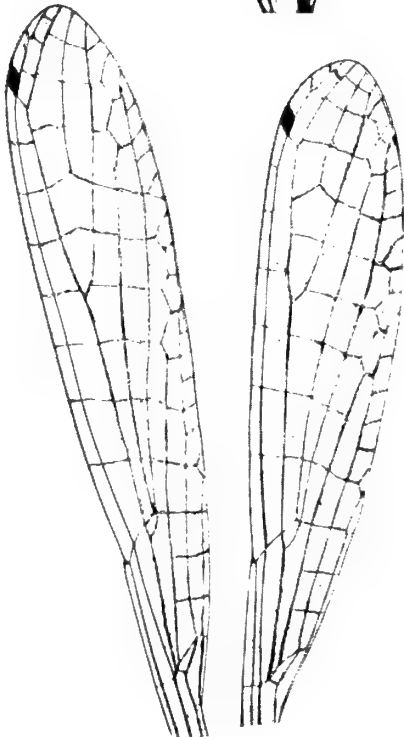
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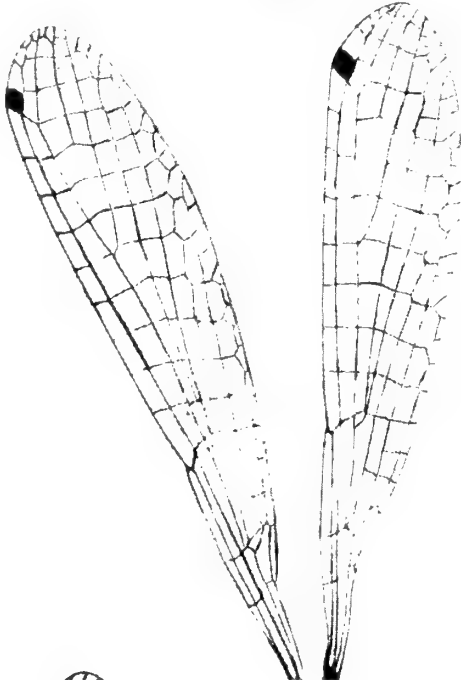
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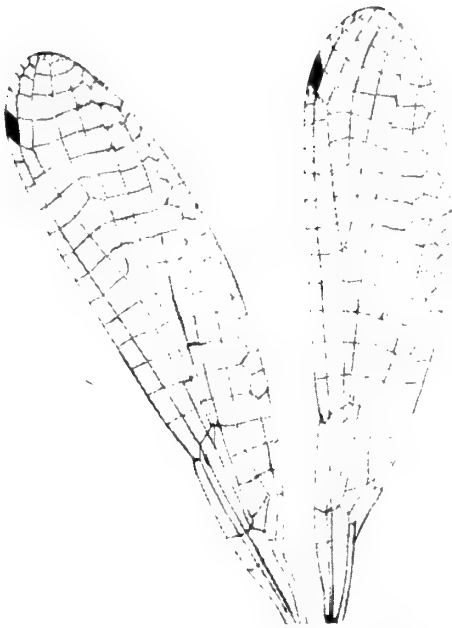
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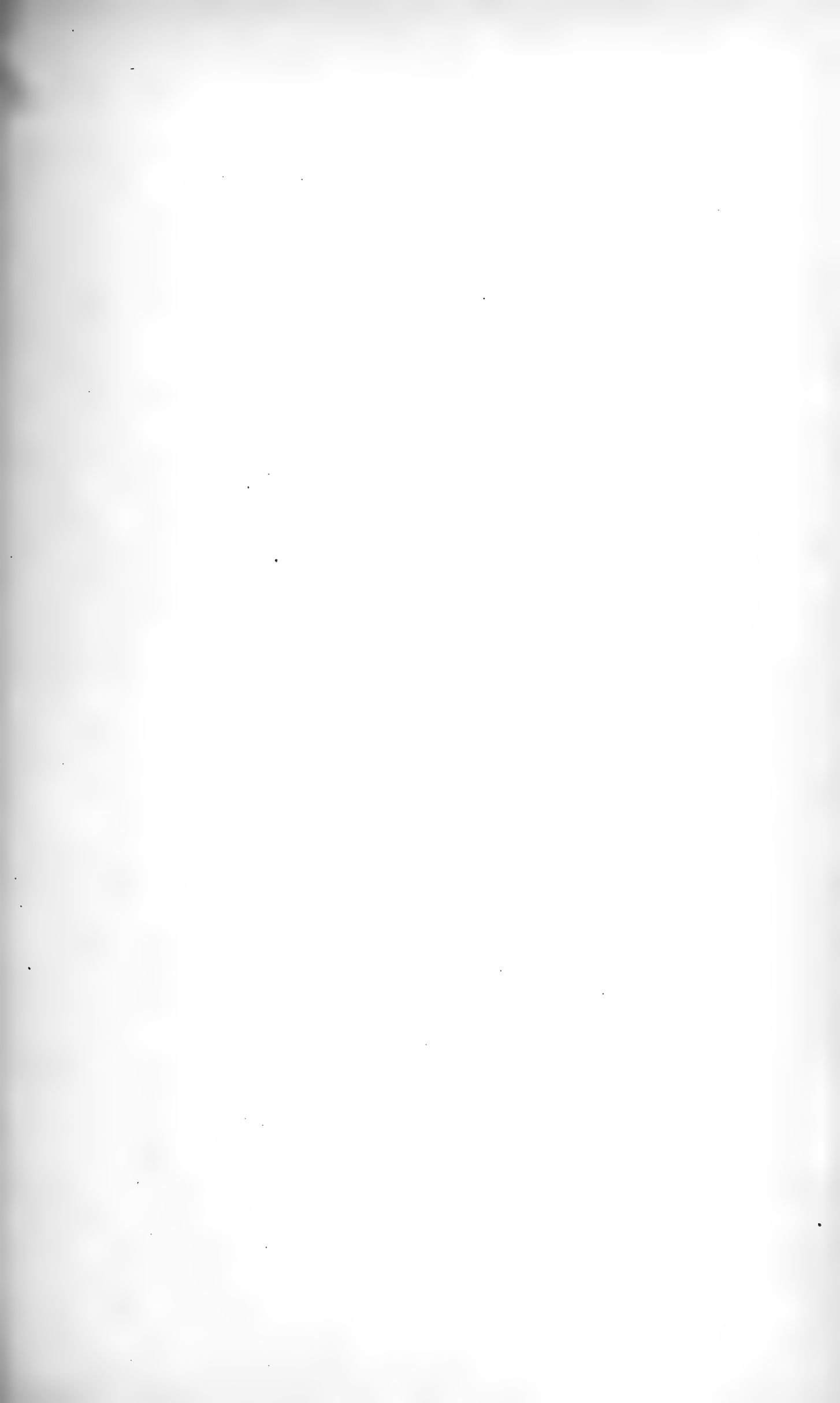
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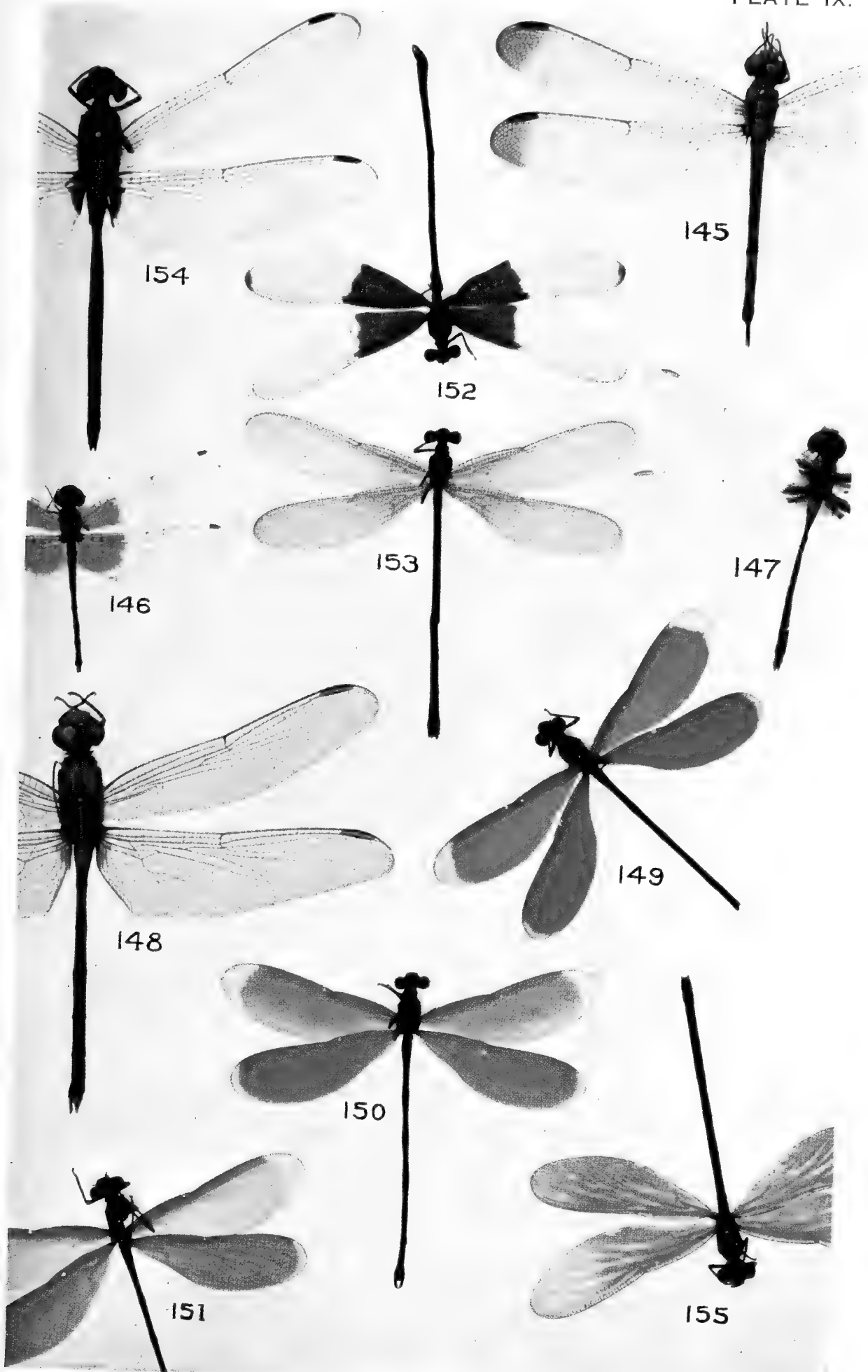
Venation of Wings from Photographs by Dr. H. G. Kribs.





## PLATE IX.

- FIG. 145. *Uracis oviposatrix*, sp. nov., ♀, Chapada.  
FIG. 146. *Gymnothemis venipunctata*, gen. et sp. nov., ♂, Chapada.  
FIG. 147. *Brechmorhoga heteronycha*, sp. nov., ♀, Chapada, May.  
FIG. 148. *Rhodopygia hollandi* Calvert, ♂, Cuyabá.  
FIGS. 149-151. *Lais pudica* Hagen, Chapada, 3 ♂ of different ages showing the replacement of the brown of the wings of the youngest individuals by red in later life.  
FIGS. 152, 153. *Heterina fuscibasis*, sp. nov., Chapada, ♂ and ♀.  
FIG. 154. *Erythemis hematogastra* Burmeister, ♂, Cachoeira Cuyabá, January 27. For comparison with *Rhodopygia hollandi* as possible examples of mimicry.  
FIG. 155. *Lais pudica* Hagen, ♀, Chapada.





#### IV. DEINOSUCHUS<sup>1</sup> HATCHERI,<sup>2</sup> A NEW GENUS AND SPECIES OF CROCODILE FROM THE JUDITH RIVER BEDS OF MONTANA.

By W. J. HOLLAND.

Upon the occasion of the geological reconnaissance undertaken jointly by Mr. T. W. Stanton and Mr. J. B. Hatcher under the auspices of the United States Geological Survey in the summer of the year 1903, Mr. Hatcher found on Willow Creek, three miles west of Nolan and Archer's ranch, in Fergus County, Montana, some fragmentary remains lying upon the surface of the soil. He picked up a couple of scutes, which he brought back with him to the Carnegie Museum, and at the same time referred them provisionally to *Stereocephalus tutus* Lambe.<sup>3</sup> Mr. W. H. Utterback was sent to the locality by Mr. Hatcher in the fall of 1903 with instructions to thoroughly explore the spot, and recover whatever could be found.

Mr. Utterback only succeeded in finding two vertebræ, one cervical rib, one fairly complete dorsal rib, fragments of other dorsal ribs, an os pubis, a large number of scutes, some of them quite perfect, and several hundred fragments of bones, some of them no doubt belonging to the skull, others to the vertebræ and ribs, but all of them so badly broken, and a few even water-worn, that it is impossible to refer them with any degree of certainty to their true position. The vertebræ and the ribs upon examination conclusively demonstrated, as the writer pointed out to Mr. Hatcher, that the animal was a huge crocodile. Mr. Hatcher immediately lost interest in the material, and though on several occasions urged to figure and describe the bones, turned from them to other things, which at the time possessed greater interest, and then came his untimely and melancholy end.

In 1905 Professor S. W. Williston urged the writer to describe the specimen, but, though the work was begun, it is only recently that the

<sup>1</sup> δεινός = terrible; σοῦχος = crocodile.

<sup>2</sup> I take pleasure in naming the species after my associate and friend, the late Mr. John Bell Hatcher, who was the discoverer of the specimen.

<sup>3</sup> Contributions to Canadian Paleontology, Vol. III, pp. 55 *et seq.* Cf. Barnum Brown, *Bull. Am. Mus. Nat. Hist.*, Vol. XXIV, pp. 187-201.

writer has found time to complete the brief sketch of these interesting remains, which is here given.

The type (No. 963 Carnegie Museum Catalog of Vertebrate Fossils) consists of two vertebræ; a cervical rib; the first dorsal rib of the left side; fragments of several other dorsal ribs; an os pubis; twenty-five scutes in fairly good condition, and numerous fragments of others; and in addition several hundreds of comminuted fragments of vertebræ, ribs, and bones of the skull, which furnish no contacts, and defy efforts to successfully collocate them. Some of these fragments are more or less water-worn, and consist simply of bits of bone which were for the most part found by Mr. Utterback upon the surface, where the skeleton had been weathered out, and trodden under foot. Some of them suggest that they have been exposed to the action of fire, and this might well have been the case when prairie-fires swept over the spot.

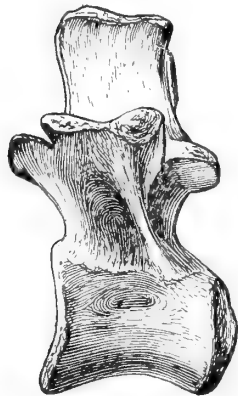


FIG. 1. Lateral view of left side of seventh (?) dorsal vertebra of *D. hatcheri*.  $\frac{1}{9}$  nat. size.

*Generic characters of Deinosuchus so far as known.* Great size, exceeding that of any other representative of the Crocodilia thus far described from North America.<sup>4</sup> Scutes massive and possessing great vertical height in comparison with their breadth, many of the smaller scutes being almost hemispherical, and some of the smallest subglobose. Pubis straighter and less deeply excavated posteriorly than in recent crocodilia. Extremities of dorsal spines of vertebræ broad transversely and thickened for attachments, much more so than in existing genera. The postzygapophyses of the vertebræ more nearly on the same plane as the transverse processes and not looking outwardly as much as in other crocodiles.

#### SEVENTH (?) DORSAL VERTEBRA.

(C. M. Cat. Vert Foss., No.  $\frac{963}{1}$ .)

The specimen, which almost beyond a doubt is the seventh in the dorsal series, is the better preserved of the two vertebræ which were recovered. It is procœlous. At the extremities of the transverse

<sup>4</sup> The writer has carefully examined and inquired in various museums at home and abroad and has been unable to find in any of them the fossil remains of any crocodile from North America equaling in size those here reported upon.



processes it shows the articulating surfaces for the ribs. It is a very massive bone and the dorsal spine is broad above, being greatly



FIG. 2. Anterior view of seventh (?) dorsal vertebra of *D. hatcheri*.  $\frac{1}{9}$  nat. size.

thickened transversely for attachment to adjacent structures. The postzygapophyses do not look as strongly outwardly as in the recent crocodilia, the under surfaces lying at their outer extremities nearly

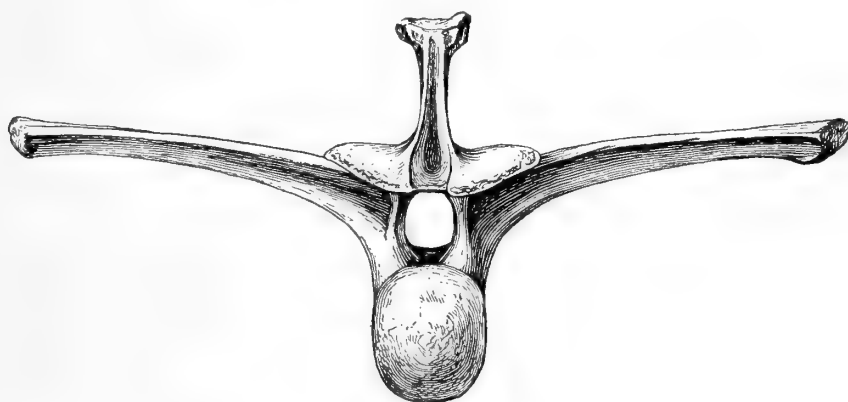


FIG. 3. Posterior view of seventh (?) dorsal vertebra of *D. hatcheri*.  $\frac{1}{9}$  nat. size.

in the same plane as the upper surface of the transverse processes. Three views of the vertebra are given in Figures 1-3.

#### DIMENSIONS.

Extreme width from tip to tip of transverse processes.....	680 mm.
Height from bottom of centrum to tip of spine... ..	310 "
Extreme length across zygapophyses.....	180 "
Length of centrum at middle.....	140 "
Length of centrum along floor of neural canal.....	125 "
Vertical diameter of centrum in front.....	122 "
Transverse diameter of centrum in front.....	122 "
Vertical diameter of centrum behind.....	110 "

Transverse diameter of centrum behind .....	95 mm.
Vertical diameter of neural canal.....	52 "
Transverse diameter of neural canal .....	35 "
Height of spine above neural canal.....	150 "
Height of spine above postzygapophyses.....	105 "
Height of spine above prezygapophyses.....	135 "
Antero-posterior diameter of spine at base.....	110 "
Antero-posterior diameter of spine at top.....	87 "
Transverse diameter of spine at base posteriorly.....	30 "
Transverse diameter of spine at base anteriorly.....	30 "
Transverse diameter of spine at top.....	65 "
Distance across postzygapophyses.....	173 "
Distance across prezygapophyses at their base.....	230 "

#### LAST LUMBAR VERTEBRA.

(C. M. Cat. Vert. Foss., No.  $\frac{963}{2}$ .)

The vertebra under consideration is not so well preserved as the one described in the preceding paragraph, but the extremity of the left

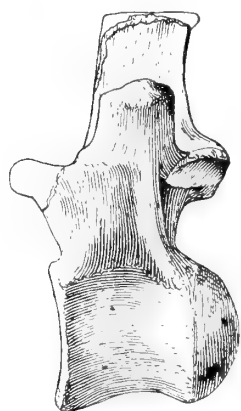


FIG. 4. Lateral view of the left side of the last (?) lumbar vertebra of *D. hatcheri*.  $\frac{1}{9}$  nat. size.

transverse process is sufficiently complete to show that it did not carry ribs. I assign it with doubt to the position of the last member of the lumbar series on account of the manner in which the spine and postzygapophyses overhang backwardly. If not that it must be one or the other of the two vertebræ immediately preceding. In general appearance it is not unlike the seventh (?) vertebra already described, except that the transverse processes are much narrower and the left, which is well preserved, shows no articular surfaces at the end. The spine has a much smaller antero-posterior diameter at the top than the seventh dorsal and its posterior margin is placed more decidedly caudad than in that vertebra. Fig. 4 shows the left side

of the vertebra, which is the more complete, and which may be compared with the corresponding view of the seventh dorsal.

#### DIMENSIONS.

Extreme width from tip to tip of transverse processes*.....	670 (?) mm.
Height from bottom of centrum to tip of spine†.....	320 ± "

\* The right transverse process is broken; the measurement given represents twice the distance from the middle of the spine to the end of the left transverse process.

† The top of the spine appears to be broken, and may not quite represent the true length in life.

Extreme length across zygapophyses.....	160 ± mm.
Length of centrum at middle.....	150 "
Length of centrum along floor of neural canal.....	90 "
Vertical diameter of centrum in front.....	130 "
Transverse diameter of centrum in front .....	105 "
Vertical diameter of centrum behind.....	110 "
Transverse diameter of centrum behind.....	85 "
Vertical diameter of neural canal.....	53 "
Transverse diameter of neural canal.. ..	35 "
Height of spine above neural canal.....	158 ± "
Height of spine above postzygapophyses.....	105 "
Height of spine above prezygapophyses.....	155 "
Antero-posterior diameter of spine at base.....	110 "
Antero-posterior diameter of spine at top.....	67 "
Transverse diameter of spine at base posteriorly.....	28 "
Transverse diameter of spine at base anteriorly.....	10 "
Transverse diameter of spine at top.....	40 ± "
Distance across postzygapophyses.....	200 "
Distance across prezygapophyses at their base.....	230 ± "

## CERVICAL RIB.

(C. M. Cat. Vert. Foss., No.  $\frac{963}{3}$ .)

A fairly well preserved specimen of the first cervical rib of the left side was found. At its proximal end it has been somewhat broken, but not enough to greatly diminish its length. Its proportions and general appearance are represented in Fig. 5, *a* representing the inner, and *b* the outer surface of the bone.

## DIMENSIONS.

Greatest length.....	235 mm.
Width at proximal end.....	37 "
Smallest width at proximal end.....	28 "
Greatest width in distal half.....	51 "
Width at distal extremity.....	17 "
Transverse diameter at proximal end.....	18 "
Transverse diameter at distal end.....	8 "

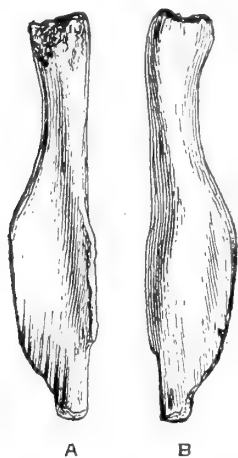
## DORSAL RIBS.

(C. M. Cat. Vert. Foss., No.  $\frac{963}{4}$ .)

A fairly well preserved specimen of the first dorsal or thoracic rib of the left side was recovered. Its shape is represented in Fig. 6, *A* showing the posterior, and *B* the anterior surface of the rib. It had been broken about the middle of the shaft and was repaired in the

laboratory. The writer has been assured that the contacts within, which are not now visible, justified the proportions which are shown by the specimen, but nevertheless is disposed to believe that the restored bone does not quite fully represent the entire length of the sternal part as it was in life. It is proportionately considerably shorter in its total length than the corresponding bone in other crocodilians. The relative length and shape of the capitulum and tuberculum is very like what is seen in the crocodiles of to-day. The tuberosity is well developed and directed forward and slightly more downward than in recent crocodilia.

FIG. 5. First cervical rib of *D. hatcheri*.  $\frac{1}{6}$  nat. size. *a*, inner surface; *b*, outer surface.



In addition to the specimen which is here figured there were found a number of fragments of ribs, one of them apparently the proximal end with the capitulum of the third thoracic rib of the left side; another evidently a piece of the upper portion of the first rib of the right side carrying the tuberosity, but lacking the capitulum and tuberculum, and still another which is apparently the

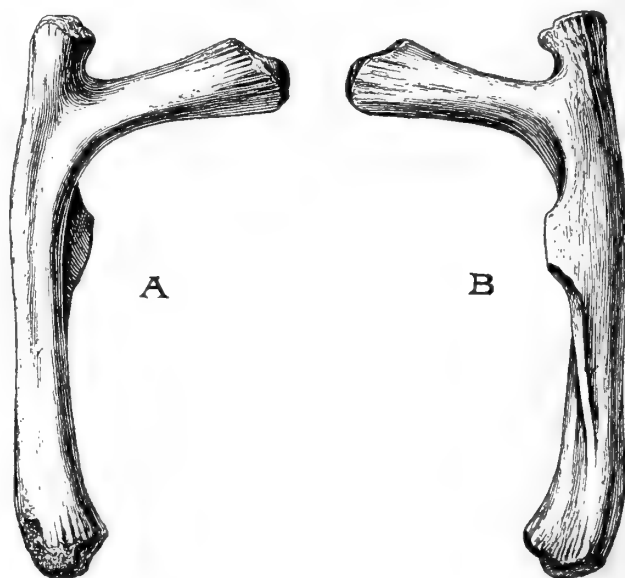


FIG. 6. Seventh (?) dorsal rib of *D. hatcheri*.  $\frac{1}{8}$  nat. size. *a*, posterior surface; *b*, anterior surface.

proximal end of the fifth dorsal. A few fragments of the distal end of the ribs also occur in the mass of bones picked up by Mr. Utterback.

## DIMENSIONS.

(First left dorsal rib. See Fig. 6.)

Greatest length from end of tuberculum to distal extremity.....	460 mm.
Distance from outer edge of tuberculum to extremity of capitulum...	220 "
Greatest width of rib over tuberosity.....	80 "
Greatest width of capitulum at end.....	60 "
Antero-posterior diameter of capitulum at end.....	32 "
Greatest width of tuberculum at end.....	50 "
Antero-posterior diameter of tuberculum .....	30 "
Greatest width of distal end of rib.....	60 "
Antero-posterior diameter of rib at end.....	35 "

## THE PUBIS.

(C. M. Cat. Vert. Foss., No.  $\frac{963}{11}$ .)

A very well preserved specimen of the right pubic bone was recovered. It agrees very closely in its general outline and proportions with the corresponding bone in recent crocodiles, but is somewhat less rounded on its distal margin and decidedly less excavated on its pos-

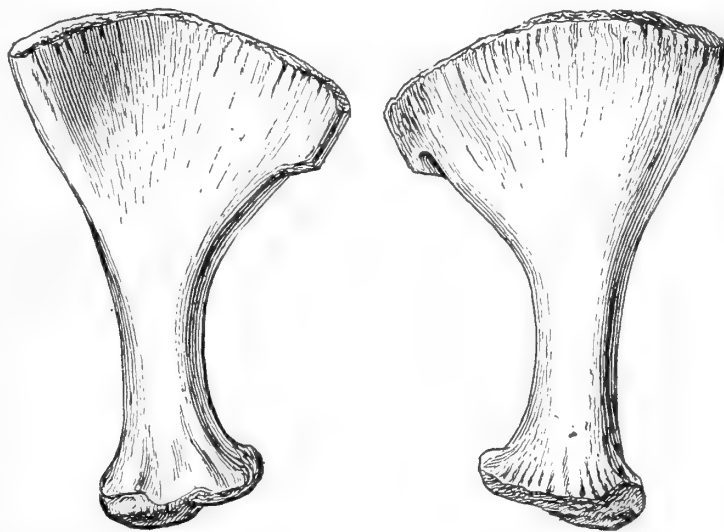


FIG. 7. Right pubis of *D. hatcheri*. About  $\frac{1}{6}$  nat. size. Figure on the left upper surface; on the right lower surface.

terior margin, at least when compared with the specimens of *Crocodylus* and *Alligator* before me. It is represented in Fig. 7, the illustration at the left of the cut showing the superior, and that on the right of the cut the inferior surfaces of the bone, the strongly curved, or excavated, side being the anterior margin.

## DIMENSIONS.

Distance from proximal extremity to distal extremity of posterior margin....	287 mm.
Distance from proximal extremity to distal extremity of anterior margin....	223 "
Antero-posterior diameter of proximal end.....	100 "
Vertical diameter of proximal end.....	55 "
Smallest antero-posterior diameter of shaft.....	45 "
Vertical diameter of shaft.....	30 "
Greatest width of distal end.....	200 "
Vertical diameter at posterior angle of distal margin.....	23 "
Vertical diameter at anterior angle of distal margin.....	10 "

## THE SCUTES.

Of the scutes representing the specimen there are twenty-five, which are in fairly good condition, and numerous fragments of others.

In a beautifully perfect skeleton of *Crocodylus acutus floridanus* before me as I write I find that there are ninety-two osseous scutes entering into the dermal covering of the neck and back.

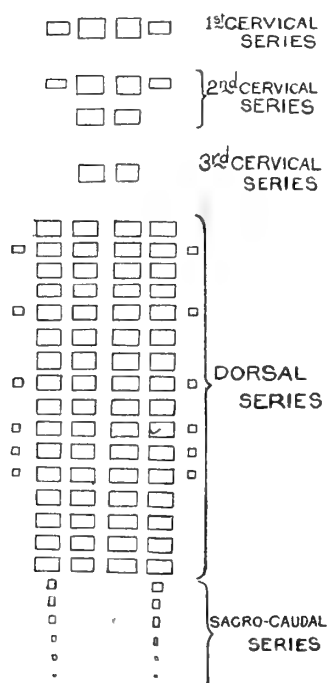


FIG. 8. Diagrammatic view of arrangement of scutes on back of *C. acutus floridanus*.

The anterior series forms a transverse row of four scutes located immediately over and covering the spine of the axis; the second series consists of two transverse rows, the first made up of four scutes, the second of two scutes, and these overlies and cover the spines of the third, fourth, and fifth cervicals. The third series is composed of two scutes, covering the spine of the sixth cervical. The spine of the seventh cervicals is not shielded above by a row of scutes; and the spine of the eighth cervical is only partially covered by the first transverse row of the dorsal series of scutes. The dorsal series is made up of fifteen transverse rows of scutes, each row composed of four or six bony plates. Those containing six plates are the second, the fifth, the eighth, the tenth, eleventh, and twelfth rows, reckoning backward. The fifteenth transverse row of scutes, overlies and

covers the spines of the third and fourth lumbar vertebræ. Following the dorsal series of scutes terminating at the point just stated, there are on either side, extending backward over the region of the sacrum and the two anterior caudal vertebræ, six bony scutes dimin-

ishing in size backward and forming the backward prolongation of the second longitudinal row of scutes reckoning from the median line

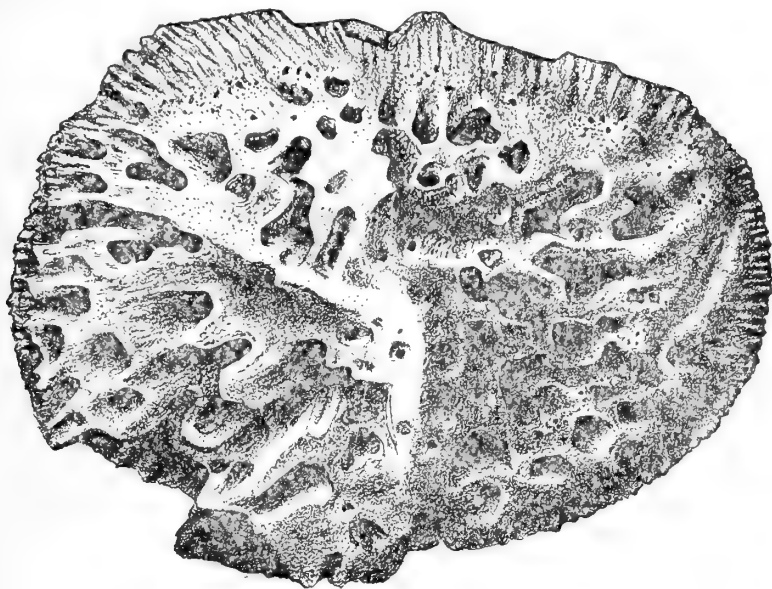


FIG. 9. Cervical scute ( $\frac{9}{1}\frac{6}{2}\frac{3}{2}$ ). Dorsal view.  $\frac{1}{2}$  nat. size.

outwardly on either side. The arrangement of the scutes in *C. floridanus* is represented diagrammatically in Fig. 8.

All the scutes in *D. hatcheri* are characterized on the superior sur-

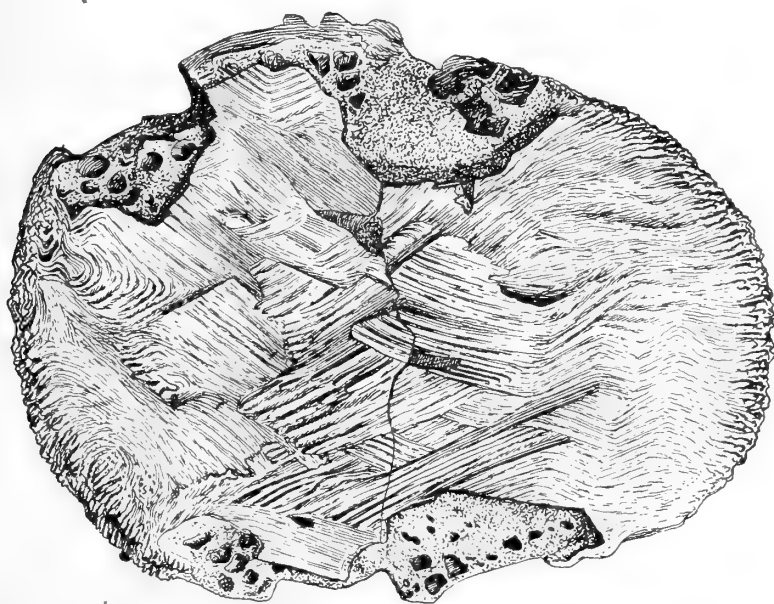


FIG. 10. Cervical scute ( $\frac{9}{1}\frac{6}{2}\frac{3}{2}$ ). Ventral view showing traces of adhesions to the corium.  $\frac{1}{2}$  nat. size.

face by an elevated longitudinal median ridge or carina, which does not, however, rise as sharply from the surface as in recent genera, and

as is shown in the figures herewith given, passes by almost insensible degrees into the surface of the adjoining parts of the scutes.

An attempt has been made by comparison with the scutes as they exist upon the back of recent crocodiles to ascertain the relative posi-

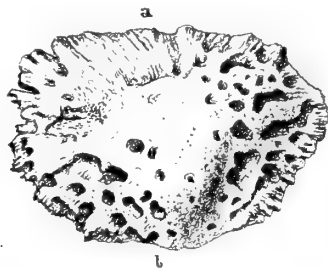


FIG. 11. Cervical scute ( $\frac{963}{13}$ ). Dorsal view. *a*, anterior margin; *b*, posterior margin. About  $\frac{1}{4}$  nat. size.

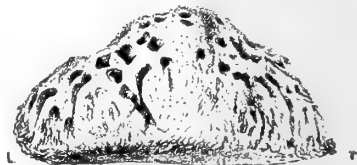


FIG. 12. Cervical scute ( $\frac{963}{13}$ ). Posterior view. *l*, left; *r*, right side. About  $\frac{1}{4}$  nat. size.

tion of the scutes belonging to the specimen of *Deinosuchus hatcheri*, but the result has not been wholly satisfactory to the writer. The scute represented in Figs. 9 and 10 appears to undoubtedly correspond to the internal right scute of the first row in the second cervical series, and the scute represented in Figs. 11-13 to be its immediate successor in the second row of the same series. Fig. 14 represents what the

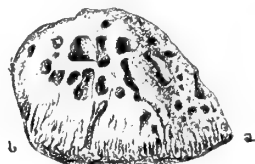


FIG. 13. Cervical scute ( $\frac{963}{13}$ ). *a*, front; *b*, back. Right lateral view. About  $\frac{1}{4}$  nat. size.

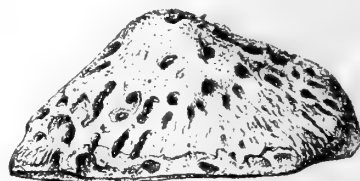


FIG. 14. Cervical scute ( $\frac{963}{15}$ ). Anterior view, showing great relative perpendicular height. About  $\frac{1}{4}$  nat. size.

writer believes to be the left scute of the third cervical series. The smaller scute represented in Fig. 16 no doubt belongs to the sacro-caudal series, and the large broad scutes, of which there are several well-preserved specimens, one of them shown in Fig. 15, can be referred approximately to their places about the middle of the dorsal series.

The scutes differ from those of all other crocodilia by their great vertical thickness in comparison with their length and breadth. They are not proportionally nearly as thin as those of any recent species, and the writer cannot discover in the literature of the subject, nor has he found in any of the collections at home or abroad crocodilian



scutes which are so heavy and massive as these. The smaller scutes are some of them almost hemispherical and a few of the smallest almost spherical in form, causing them thus to differ widely in appearance from those of other crocodilian scutes. This character is regarded by the writer as possessing generic value.

On the upper surface all of the scutes are deeply pitted on either side of the median longitudinal ridge, the pits being often confluent. The median ridge is also in almost all cases marked by a few narrow but deep circular pits. On the under side the scutes are slightly

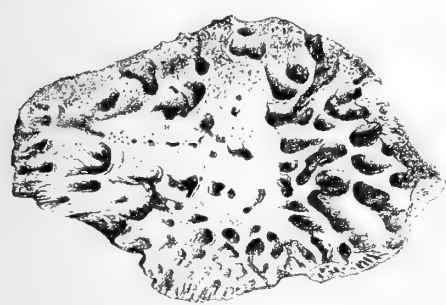


FIG. 15. Dorsal scute ( $\frac{9.63}{1.4}$ ).  
About  $\frac{1}{4}$  nat. size.



FIG. 16. Sacro-caudal scute ( $\frac{9.63}{1.6}$ ).  
1, superior view ; 2, left lateral view ; 3, posterior view ; a, front ; b, back.  
About  $\frac{1}{4}$  nat. size.

rounded at their edges in the case of the larger specimens, and quite rounded in the cases of the smaller specimens. They show on the under surface numerous fine straight lines decussating with each other at an angle of about forty-five degrees, indicating the structure of the dermal tissues in which they were imbedded and to which they adhered.\* On the anterior margin many of the scutes show bevelled margins to adapt them to union with the scutes which preceded them and evidently somewhat overlapped them in front.

DIMENSIONS OF SCUTES.

Cervical Scute. (See Figs. 9 and 10.)

(Carnegie Museum Cat. Vert. Foss. No.  $\frac{9.63}{1.2}$ .)

Antero-posterior diameter.....	111 mm.
Transverse diameter.....	143 “
Greatest vertical diameter.....	58 “

\*Sir Richard Owen (Report of the British Association for the Advancement of Science, 11th meeting, 1841, p. 71) calls attention to a similar feature in the scutes of *Goniopholis crassidens* Owen.

? Cervical Scute. (See Figs. 11-13.).

(Carnegie Museum Cat. Vert. Foss. No.  $\frac{863}{13}$ .)

Antero-posterior diameter.....	80 mm.
Transverse diameter.....	115 "
Greatest vertical diameter.....	60 "

Dorsal Scute. (See Fig. 15.)

(Carnegie Museum Cat. Vert. Foss. No.  $\frac{963}{14}$ .)

Antero-posterior diameter.....	103 mm.
Transverse diameter.....	160 "
Greatest vertical diameter.....	42 "

Sacro-caudal Scute. (See Fig. 16.)

(Carnegie Museum Cat. Vert. Foss. No.  $\frac{963}{16}$ .)

Antero-posterior diameter.....	60 mm.
Transverse diameter.....	37 "
Greatest vertical diameter.....	33 "

COMPARATIVE MEASUREMENTS OF THE CORRESPONDING BONES IN THE SKELETON OF CROCODYLUS FLORIDANUS (Carnegie Museum Accession No.  $\frac{1010}{2}$ ) AND THE TYPE OF DEINOSUCHUS HATCHERI (Carnegie Museum Cat. Vert. Foss., No. 963).

Cervical Rib.

	<i>C. floridanus.</i>	<i>D. hatcheri.</i>
Length .....	105 mm.	235 mm.
Width at proximal end.....	12 "	37 "
Smallest width in proximal half.....	9 "	28 "
Greatest width in distal half.....	13 "	51 "
Width at distal end.....	5 "	17 "
Transverse diameter at proximal end.....	6 "	18 "
Transverse diameter at distal end.....	2.5 "	8 "

Dorsal Rib.

Greatest length from end of tuberculum to distal extremity.....	125 mm.	460 mm.
Distance from outer edge of tuberculum to end of capitulum.....	50 "	220 "
Greatest width of rib over tuberosity.....	22 "	80 "
Greatest width of capitulum at end.....	10 "	60 "
Greatest width of tuberculum at end.....	15 "	50 "
Greatest width of distal end of rib.....	13 "	60 "

*Pubis.*

Distance from proximal end to distal end of posterior margin.....	78	mm.	287	mm.
Distance from proximal end to distal end of anterior margin .....	80	"	223	"
Antero-posterior diameter of proximal end..	23	"	100	"
Vertical diameter of proximal end.....	15	"	55	"
Smallest antero-posterior diameter of shaft..	12	"	45	"
Vertical diameter of shaft.....	9	"	30	"
Greatest width at distal end.....	54	"	200	"
Vertical diameter at posterior angle of distal margin .....	5	"	23	"
Vertical diameter at anterior angle of distal margin .....	2.5	"	10	"

*Seventh Dorsal Vertebra.*

Extreme width across transverse processes..	158	mm.	680	mm.
Height from bottom of centrum to top of spine.....	60	"	310	"
Length across zygapophyses.....	60	"	180	"

*Last (?) Lumbar Vertebra.*

Extreme width across transverse processes..	135	mm.	670	mm.
Height from bottom of centrum to top of spine.....	83	"	320	"
Length across zygapophyses.....	58	"	160	"

The measurements given in the foregoing comparative table for *Crocodylus floridanus* yield a total of 1220, from which we obtain a general average of 43.5. The total of the measurements given for *Deinosuchus hatcheri* is 4617, yielding us a general average of 164.8. The length of the specimen of *Crocodylus floridanus* from the tip of the nose to the end of the tail, from which the measurements in the first column were derived, is 3050 mm. In the ratio of 43.5 to 164.8 we would find that the total length of *Deinosuchus hatcheri*, provided it was built on the same relative proportions as *Crocodylus floridanus*, would be 13,830 mm., or about 45 feet in length.

This method of calculating may be open to objection and the result may be somewhat excessive. We may approach the problem in another way. We may assume that the length of the seventh dorsal vertebra represents the average length of the vertebræ in the series. In fact the centra of the caudals about the middle of the tail in all crocodilian skeletons I have examined considerably exceed in length

the centra of the anterior vertebræ, though the last eight or nine rapidly decrease. The centrum of the seventh dorsal in the specimen of *C. floridanus* before me certainly is rather under than over the average length of the members of the series. The length of the seventh dorsal in *D. hatcheri* is almost exactly six inches. The number of vertebræ in the total series is sixty (?). This would give us a length of thirty feet, without taking into account the length of the skull from its point of union with the atlas to the tip of the snout, which in *C. floridanus* is as 13 to 60. Applying this proportion to the case in hand we would have a length of from five to six feet for the skull. Adding this to the length of the vertebral column back of the head we have thirty-five as the total length of the bony framework of the animal. It is therefore no exaggeration to say that *D. hatcheri* must have been a crocodile which possessed a length of from thirty-five to forty feet, exceeding thus in length the largest specimen of *C. porosus* of which we have record, which is said to have been thirty-three feet in length, and therefore the longest crocodile belonging to a living species, which has ever been observed.

*Deinosuchus hatcheri* was undoubtedly one of the hugest representatives of the Crocodilia which has existed upon our globe.

V. REPORTS ON THE EXPEDITION TO BRITISH GUIANA  
OF THE INDIANA UNIVERSITY AND THE  
CARNEGIE MUSEUM, 1908.

REPORT NO. 3. THE MARINE FISHES.<sup>1</sup>

BY CHRISTIAN B. BLOSSER.

As stated elsewhere,<sup>2</sup> the object of the expedition to British Guiana was to secure fresh-water fishes. To that object other desirable things were sacrificed.

No special effort was made to collect marine fishes, but during a stay of about twelve hours at the Island of St. Croix, Danish West Indies, a short seine was used among the rocks of the coast, and fishes were purchased in the market, and from a group of men fishing with a large seine. The markets of others of the Windward Islands were also visited. At Georgetown, British Guiana, the market was visited regularly. Few marine fishes are brought to this market, and no systematic effort was made to collect all the species which appeared.

Mrs. C. Bjerg of St. Croix kindly secured a number of fresh-water fishes from the Island of St. Croix, which are included in this list, in which several rare species are enumerated, and a few new things are described.

The numbers refer to the Catalog of Fishes of the Carnegie Museum, and to that of the Indiana University. Unless otherwise stated the specimens are from St. Croix.

GALEIDÆ.

1. **Hypoprion signatus** (?) Poey. Georgetown Market. C. M. Cat. No. 1292.

CLUPEIDÆ.

2. **Ilisha flavipinnis** (Valenciennes). Georgetown Market. C. M. Cat. No. 1485.

HEMIRAMPHIDÆ.

3. **Hemiramphus brasiliensis** (Linnaeus). C. M. Cat. No. 1199.

<sup>1</sup> Contributions from the Zoölogical Laboratory of Indiana University, No. 103.

<sup>2</sup> ANN. CARN. MUS., Vol. VI, p. 4.

## FISTULARIDÆ.

4. **Fistularia tabacaria** Linnæus. C. M. Cat. No. 1244.

## MUGILIDÆ.

5. **Agonostomus monticola** (Bancroft). Fresh-waters of St. Croix. C. M. Cat. No. 1200.

6. **Mugil brasiliensis** Agassiz. Fresh-waters of Barbadoes, and Georgetown Market. C. M. Cat. No. 1433.

7. **Mugil curema** Cuvier & Valenciennes. Georgetown Market. C. M. Cat. No. 1472.

## POLYNEMIDÆ.

8. **Polydactylus virginicus** (Linnæus). Georgetown Market. C. M. Cat. No. 1470.

## HOLOCENTRIDÆ.

9. **Myripristis jacobus** Cuvier & Valenciennes. Santa Lucia. C. M. Cat. No. 1201.

10. **Helocentrus ascensionis** (Osbeck). C. M. Cat. No. 1202.

## MULLIDÆ.

11. **Upeneus maculatus** (Bloch). C. M. Cat. No. 1203.

12. **Upeneus martinicus** Cuvier & Valenciennes. C. M. Cat. No. 1204.

## CARANGIDÆ.

13. **Caranx latus** Agassiz. C. M. Cat. No. 1205.

14. **Caranx ruber** (Bloch). C. M. Cat. No. 1206.

15. **Decapterus punctatus** (Agassiz). C. M. Cat. No. 1207.

## CHEILODIPTERIDÆ.

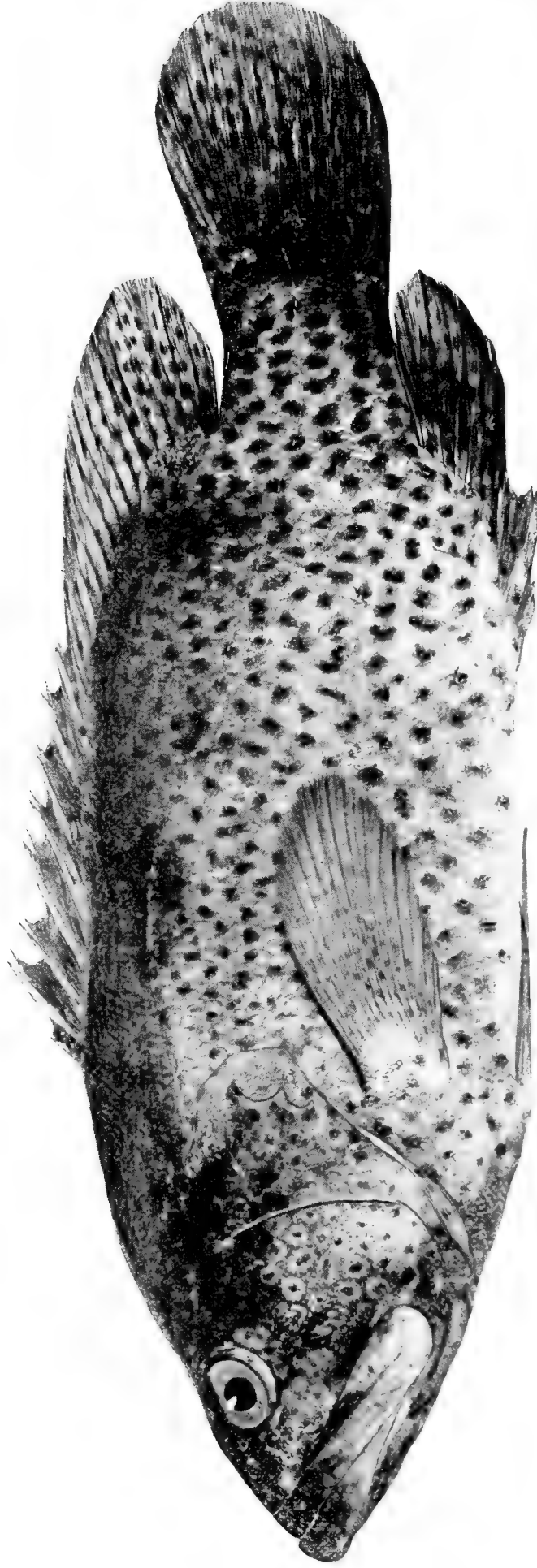
16. **Apogonichthys melampodus** sp. nov.

Type unique, 35 mm. (Carnegie Museum Catalog of Fishes, No. 1474.) St. Croix.

D. VI-I, 9; A. II, 6; head 2.7; depth 3; scales 3-23-6; eye 2.5 in head; snout 5; maxillary 1.7; interorbital space 3.3.

Head somewhat compressed; profile evenly rounded from the snout to first dorsal. Eye large; mouth large, oblique, maxillary reaching the posterior border of the orbit. Teeth small, in broad bands in each jaw. Teeth on vomer and palatines small. Preopercle with several teeth near the angle. Gillrakers slender, 10 on the lower half of first arch. First dorsal of six weak spines, the last one very small,





*Bodianus stellatus* Blosser, sp. nov.



the first one five in the head. Anal similar to soft dorsal, its first spine very short, the second 3.3 in head. Ventrals reaching middle of the base of the anal.

Color in spirits a pale brown. Scales of the entire body with fine punctulations. A series of dots along the median row of scales. Snout and maxillary spotted; a dark streak extending back and upward from eye; a narrow longitudinal streak extending straight back from the eye and becoming much wider on the opercle; a similar streak extending down and back from the eye. Dorsal, anal, and ventrals black. Pectorals pale, caudal blackish.

This species is closely related to *Apogonichthys puncticulatus*, but differs from it in having no markings on the pectoral, and in having dark streaks extending from the eye.

## SERRANIDÆ.

17. *Epinephelus adscensionis* (Osbeck). C. M. Cat. No. 1208.

18. *Bodianus fulvus* (Linnæus). C. M. Cat. No. 1209.

19. *Bodianus ruber* (Bloch & Schneider). C. M. Cat. No. 1210.

20. *Bodianus punctatus* (Linnæus). C. M. Cat. No. 1212.

21. *Bodianus stellatus*, sp. nov. Plate X.

Type, 193 mm. (Carnegie Museum Catalog of Fishes, No. 1473.)  
St. Croix.

D. IX, 14; A. III, 8; head  $2\frac{7}{9}$ ; depth 3; eye 5.2 in head; scales 9 to 12-84-25.

Body moderately compressed, not much elevated. Head rather long; profile with a concavity between the eyes; snout  $3\frac{3}{4}$  in the head.

Lower jaw strongly projecting. Teeth in rather broad bands, the inner series large and depressible. Anterior canines rather strong, one on each side, above and below. Maxillary extending beyond the posterior border of the orbit, its width at its distal end a little less than the diameter of the eye; preopercle finely serrate, the angle rounded, the serræ not at all enlarged at the angle. Middle opercular spine nearer the lower than the upper, the lower and upper shorter than the middle one. Gillrakers 10, with about 5 rudiments in front of the angle. Head covered with fine cycloid scales. Dorsal originating slightly behind the base of the pectorals, third dorsal spine longest, 3.3 in head. Soft dorsal and the anal rounded. Second anal spine strong, about as long as the third; caudal rounded.

Color in spirits dark brown; sides of the body and the fins covered

with darker spots; sides of the head with light spots, which have a dark center.

This species is closely related to *Bodianus tæniops*, but the spots on the head have a dark center and a pale instead of a black edge.

## LUTIANIDÆ.

- 22. *Neomænis griseus* (Linnæus). C. M. Cat. No. 1212.
- 23. *Neomænis mahogoni* (Cuvier & Valenciennes). C. M. Cat. No. 1213.
- 24. *Ocyurus chrysurus* (Bloch). C. M. Cat. No. 1214.

## HÆMULIDÆ.

- 25. *Hæmulon sciurus* (Shaw). C. M. Cat. No. 1216.
- 26. *Hæmulon plumieri* (Lacépède). C. M. Cat. No. 1217.
- 27. *Hæmulon flavolineatum* (Desmarest). C. M. Cat. No. 1218.
- 18. *Bathystoma rimator* (Jordan & Swain). C. M. Cat. No. 1219.

## GERRIDÆ.

- 29. *Eucinostomus pseudocula* (Poey). C. M. Cat. No. 1220.
- 30. *Xystæma cinereum* (Wahlbaum). Fresh-waters of Barbadoes. C. M. Cat. No. 1434.

## POMOCENTRIDÆ.

- 31. *Eupomacentrus leucostictus* (Müller & Troschel). C. M. Cat. No. 1221.
- 32. *Abudefduf saxatilis* (Linnæus). C. M. Cat. No. 1222.
- 33. *Chromis marginatus* Castelnau. Plate XI.  
41 mm. C. M. Cat. No. 1476. St. Croix.

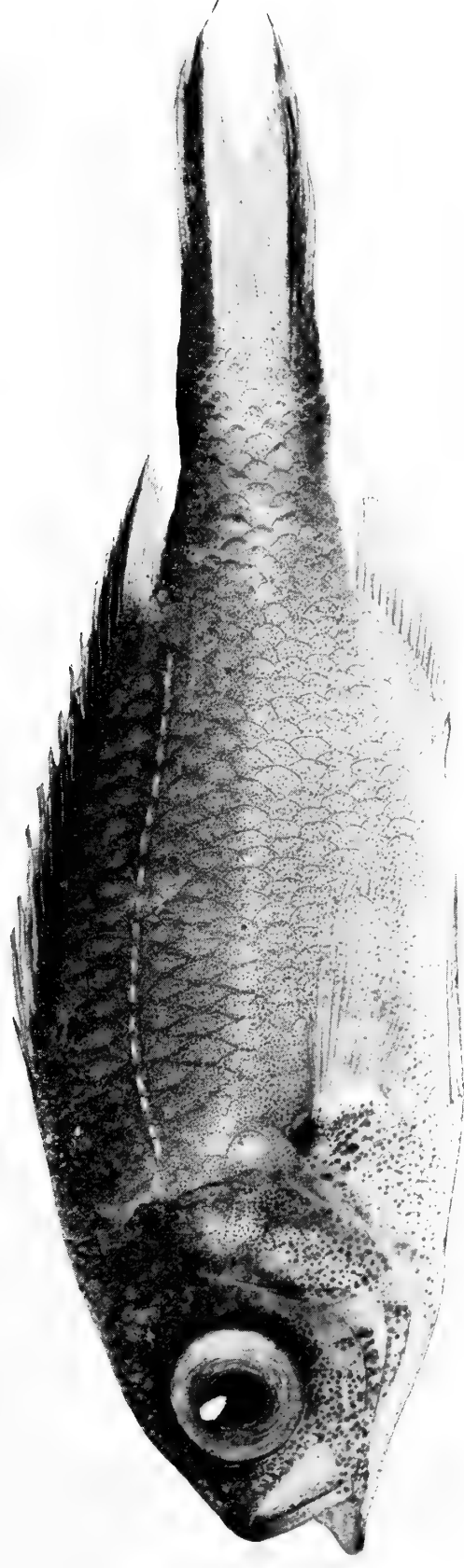
The specimens closely resemble specimens of *Chromis marginatus* collected by Mr. J. D. Haseman in Bahia, C. M. Cat. No. 2056.

## LABRIDÆ.

- 34. *Harpe rufa* (Linnæus). C. M. Cat. No. 1223.
- 35. *Iridio bivittatus* (Bloch). C. M. Cat. No. 1224.
- 36. *Iridio kirschi* Jordan & Evermann. C. M. Cat. No. 1225.
- 37. *Chlorichthys nitidus* (Günther). C. M. Cat. No. 1226.

## SCARIDÆ.

- 38. *Scarus croicensis* (Bloch). C. M. Cat. No. 1227.
- 39. *Scarus tæniopterus* Desmarest. C. M. Cat. No. 1228.



*Chromis marginatus* Castelnau.



40. *Sparisoma aurofrenatum* (Cuvier & Valenciennes). C. M. Cat. No. 1229.

41. *Sparisoma abildgaardi* (Bloch). C. M. Cat. No. 1230.

42. *Sparisoma flavescens* (Bloch & Schneider). C. M. Cat. No. 1231.

43. *Sparisoma xystrodon* Jordan & Evermann. C. M. Cat. No. 1232.

#### CHÆTODONTIDÆ.

44. *Chætodon striatus* Linnæus. C. M. Cat. No. 1233.

45. *Chætodon capistratus* Linnæus. C. M. Cat. No. 1234.

46. *Holocanthus tricolor* (Bloch). C. M. Cat. No. 1236.

47. *Holocanthus lunatus*, sp. nov. Plate XII, fig. 1.

Type unique, 19 mm. (Carnegie Museum Catalog of Fishes, No. 1235.) St. Croix.

D. XIV, 18; A. III, 18; head 2.8; depth 1.7; eye 2.75 in head. Body ovate, compressed, greatly elevated. Head moderate in size and rounded; profile regularly curved from the first dorsal to the tip of the snout. Snout prominent. Mouth small, a long, strong spine at the angle of the preopercle, a few minute ones above it. Scales imbricate, exposed portion with many fine parallel lines, which end in fine points, making the scales exceedingly ctenoid. Soft dorsal and anal angulate. Caudal convex.

Ground color in spirits dark brown with four vertical pale bands, the first pale band beginning at the front of the spinous dorsal and extending across the opercle in front of the pectorals to the base of the ventrals; the second band extends from the fifth dorsal spine to the vent; the third from the front part of soft dorsal spine to the vent; the fourth just in front of the base of the caudal; area between first and second bands partly light in color; frontal area and head in front of eye white.

#### TEUTHIDÆ.

48. *Teuthis cœruleus* (Bloch & Schneider). C. M. Cat. No. 1237.

49. *Teuthis hepatus* Linnæus. C. M. Cat. No. 1238.

50. *Teuthis bahianus* (Castelnau). C. M. Cat. No. 1239.

#### BALISTIDÆ.

51. *Balistes vetula* Linnæus. C. M. Cat. No. 1240.

## MONOCANTHIDÆ.

52. *Alutera punctata* Agassiz. C. M. Cat. No. 1241.  
53. *Monocanthus ciliatus* (Mitchell). C. M. Cat. No. 1242.

## TETRADONTIDÆ.

54. *Spheroides asterias* sp. nov. Plate XII, Fig. 2.  
Type 28 mm. (Carnegie Museum Catalog of Fishes, No. 1475.)  
St. Croix.

Cotypes, 2 specimens, 18 and 21 mm. (I. U. Cat. No. 11924.)

D. 10; A. 9; P. 14; head 2.3 (3.1 in the total length); snout 2 in the head; eye 3; interorbital 2.6. Head large; profile of the snout concave. Nostrils nearer the eye than to the tip of the snout; mouth very small; opercular cleft very short, almost vertical. Entire body, except the snout and the caudal peduncle, covered with prickles. Dorsal rather high, 2.6 in head, its origin slightly in front of anal. Sides of the head and upper parts of the body with small round blackish dots, which form more or less longitudinal rows or streaks. Belly paler than upper parts, with spots less distinct, these not seen in some specimens; dark streaks radiating from eye like the rays of an aster; pectoral dusky, with a dark bar at the base. Caudal margin black, inner rays pale; a dark median ventral line.

This species closely resembles *Spheroides testudineus*. It differs in having a larger eye and the margins of the caudal black.

## MALACANTHIDÆ.

55. *Malacanthus plumieri* (Bloch). C. M. Cat. No. 1215.

## GOBIIDÆ.

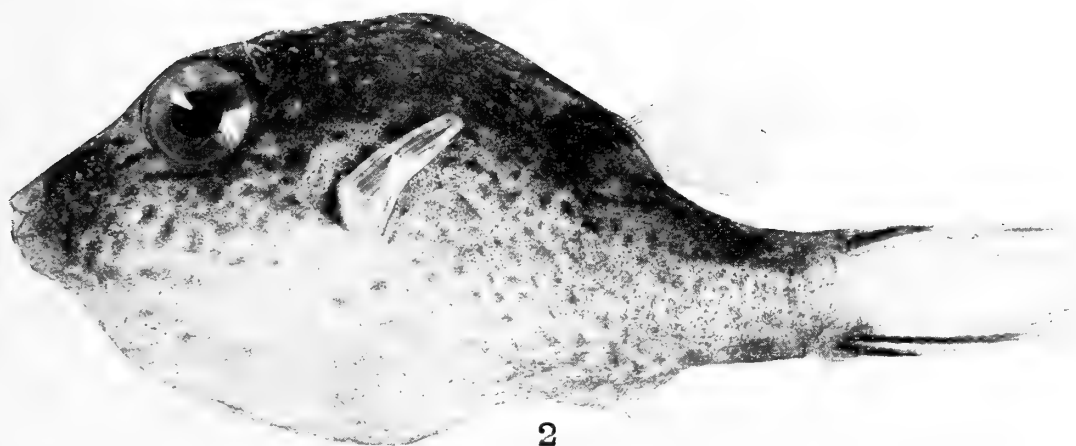
56. *Eleotris pisonis* (Gmelin). C. M. Cat. No. 1245.  
57. *Gobius lyricus* Girard. C. M. Cat. No. 1246.

## GOBIESOCIDÆ.

58. *Gobiesox cephalus* Lacépède. Georgetown Market. C. M. Cat. No. 1471.



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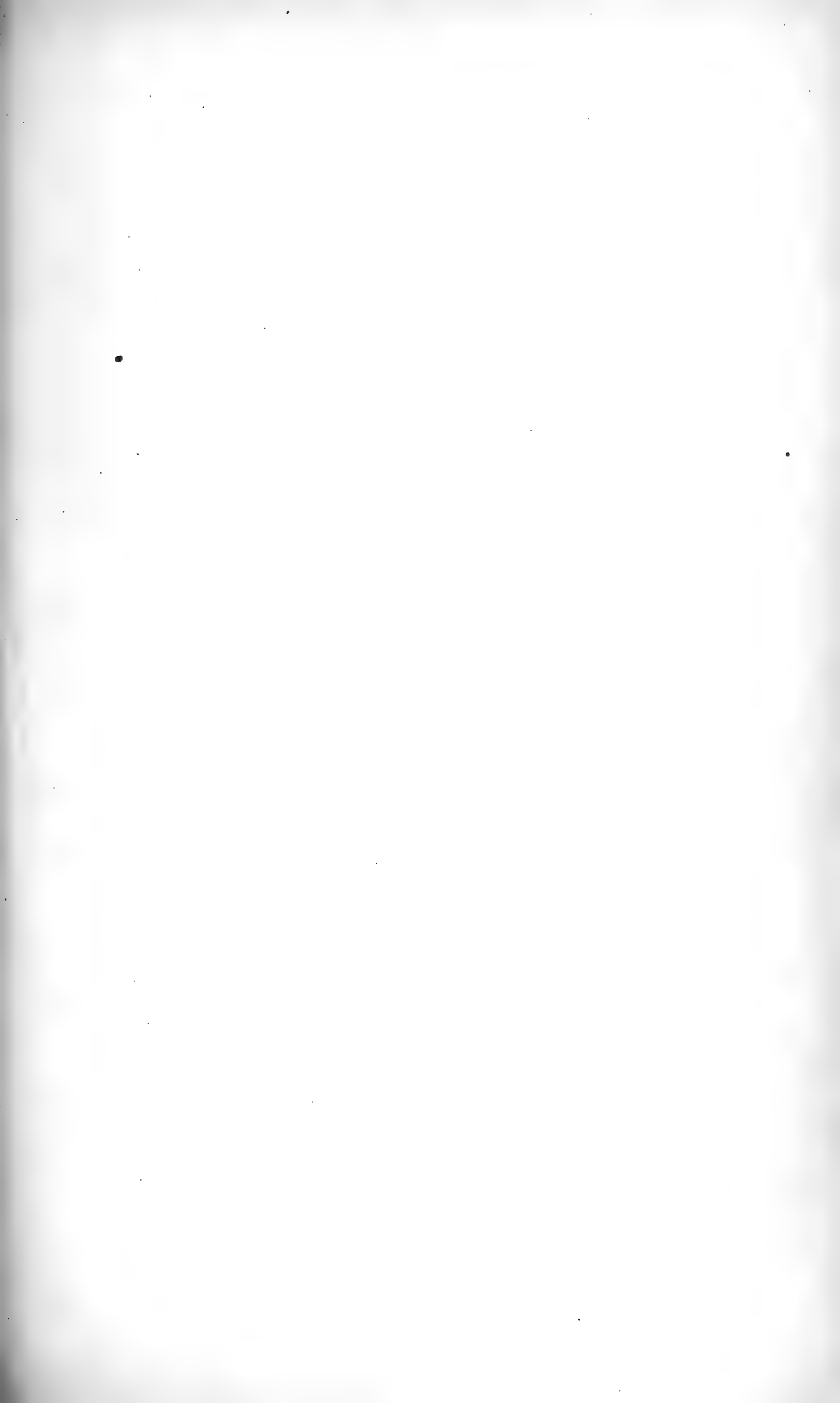


2

Fig. 1. *Holocanthus lunatus* Blosser, sp. nov.  
Fig. 2. *Sphaeroides asterias* Blosser, sp. nov.











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Publications of the Carnegie Museum

Serial No. 60

# ANNALS

OF THE

# CARNEGIE MUSEUM

VOL. VI. Nos. II, III AND IV.

August, 1910.



For sale by Messrs. Wm. Wesley & Sons, 28 Essex St. Strand, London, England;  
Messrs. R. Friedländer u. Sohn, 11 Carlstrasse, Berlin, N. W. 6., Germany; and at  
the Carnegie Museum, Schenley Park, Pittsburgh, Pa., U. S. A.



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W. J. HOLLAND, *Editor*

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PUBLISHED BY THE AUTHORITY OF THE  
BOARD OF TRUSTEES OF THE CARNEGIE INSTITUTE  
AUGUST, 1910

PRESS OF  
THE NEW ERA PRINTING COMPANY  
LANCASTER, PA



# ANNALS

OF THE

# CARNEGIE MUSEUM

VOLUME VI. NOS. 2-3.

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## EDITORIAL NOTES.

THE collections of birds belonging to the Museum have been enlarged by the acquisition of a fine series of the birds of the Bahaman Islands collected by Mr. W. W. Worthington during the late winter and spring of the present year. Mr. Worthington visited all of the islands and succeeded in obtaining specimens of all the species which have hitherto been recorded from the islands, as well as a new species, which has been described by Mr. W. E. C. Todd as *Dendroica flavescens* in the Proceedings of the Biological Society of Washington, Vol. XXII, pp. 171-172.

There have also been received considerable collections of birds from eastern Bolivia taken by Mr. José Steinbach.

Mr. M. A. Carriker, Jr., sailed from New York on July the 29th in order to take up the work of collecting birds for the Museum in north-western South America. He will first explore the valley of the Orinoco, working westward and southward.

---

MR. JOSEPH A. SANTENS is engaged in mounting a number of very life-like groups of our native birds in their nesting positions. A special effort was made this spring to secure good specimens of some of the birds, which are rarely seen on their nests except by careful observers. Among the groups in course of preparation is that of a pair of sharp-shinned hawks upon the nest, a group of green bitterns upon their nest, and a group of cliff-swallows associated with Phœbes, which were found amicably living together.

MR. O. A. PETERSON is continuing his work in Sioux County, western Nebraska, devoting himself to the task of securing a quantity of the remains of the extinct Camelidæ. At the end of July he reports himself as having found quite a number of skeletons beautifully complete and in perfect condition, which he is taking up as rapidly as he can. Mr. Earl Douglass is hard at work in western Colorado and eastern Utah, and reports himself as successful in his labors. He has found a considerable quantity of interesting dinosaurian material, which at his last writing was engaging his attention. He is also continuing his work in the Uinta Basin.

Mr. Percy E. Raymond is hard at work upon the local invertebrate faunæ found at various horizons in the vicinity of Pittsburgh. He has recently found some reptilian remains, which have been referred to Professor E. C. Case for study and determination.

THE making of the two replicas of the *Diplodocus*, one intended for the emperor of Austria and the other for the king of Italy, has been completed. They have been shipped, and at the time that these pages pass through the press the Director will be in Vienna engaged in installing the first specimen. The specimen presented to the king of Italy by Mr. Carnegie will be installed in the Aldrovandi Museum at Bologna in October. It will not be possible to complete the replica intended to be placed in the Grand Hall of Conference of the Imperial Academy of Sciences at St. Petersburg this fall. The replica cannot be completed until the spring of 1910.

WORK upon the cabinets in the entomological laboratory has been pushed forward as rapidly as possible. Thirty cabinets, capable of holding two thousand seven hundred drawers, have thus far been erected. The material for as many more has been gotten out and they will be assembled as rapidly as possible. It is hoped by the Director on his return from Europe to find that this work has been advanced very near to completion. When it has been concluded the work of building the cabinets for the Section of Invertebrate Zoölogy, and more particularly for the conchological collections, will have to be taken up.

DURING the absence of the Director in Europe the administration of the affairs of the office will devolve largely upon his Assistant, Mr. Douglas Stewart, who is in possession of full instructions from the Director as to his plans and purposes.

THE Editor of the ANNALS sailed from New York on the morning of August 21st, and reached London on the evening of the 28th. Monday, the 30th of August, was spent at the British Museum of Natural History. After a brief visit to Amsterdam, Munich, and Prague, where the museums of zoölogy and paleontology were thoroughly studied and a number of the leading paleontologists of Europe were met, Vienna was reached. A cordial reception from Dr. Franz Steindachner, the Intendant of the K. K. Hofmuseum and his associates was encountered, and the proofs of the ANNALS, pp. 301-312, were received and have been corrected.

W. J. HOLLAND.

VIENNA, AUSTRIA, Sept. 8, 1909.

## VI. PRELIMINARY DESCRIPTIONS OF SOME NEW TITANOTHERES FROM THE UINTA DEPOSITS.

BY EARL DOUGLASS.

The writer, with an assistant, Mr. J. F. Goetschius, spent the summer of 1908 collecting fossils in the Uinta Basin in eastern Utah and western Colorado. The principal object of the expedition was the acquisition of Upper Eocene vertebrates and the extension of our knowledge of the geology of the region and the sequence of the extinct mammalian faunæ. About thirteen years had elapsed since the last collecting party had visited the Uinta deposits, and the underlying Tertiary formations had never been carefully explored.

The Director of the Carnegie Museum, Dr. William J. Holland, made it possible to conduct the expedition as the present writer believed it should be conducted, and by dint of thorough and persistent search it was successful in securing a large collection of mammals and reptiles from several different levels of the Uinta deposits through a thickness of 700 feet, or more, of strata. The collections came principally from Horizon "B" of Peterson, and probably, as a rule, from lower levels than those from which previous collections had been made. This undoubtedly accounts for the fact, that, as the fossils are removed from the matrix, a large proportion of them are seen to belong to undescribed species, or exhibit some differences from those which have been previously described.

On account of the large amount of work to be done at the Museum and the condition of the specimens from the Uinta deposits the work of clearing the fossils from the matrix has proceeded slowly, and only a small portion of the material is ready for study. As the absence of the writer during the summer will suspend the work in the laboratory, and as Professor Henry F. Osborn, who is preparing a memoir on the Titanotheres, says that it is especially important that we should know more of the Upper Eocene members of that family, it is thought best to publish a short description of some of those which present new characters.

Had it not been for the kindness of Professor Osborn in allowing

me the free use of his specimens and drawings of the *Titanotheridæ* and for Mr. Wm. K. Gregory's valuable assistance in the comparison and determination of specimens, even this preliminary paper could not have been prepared at this time.

***Telmatherium? incisivum* sp. nov.**

(PLATE XIII, FIG. 1.)

(No. 2398 Carnegie Museum Catalog of Vertebrate Fossils.)

A skull lacking the ends of the nasals. From a thick deposit of sandstone and small gravel evidently of stream origin, near the middle of horizon "B," about three miles northeast of Well 2, Uinta Basin, Utah.

I think that this skull represents a different genus from *Telmatherium*,

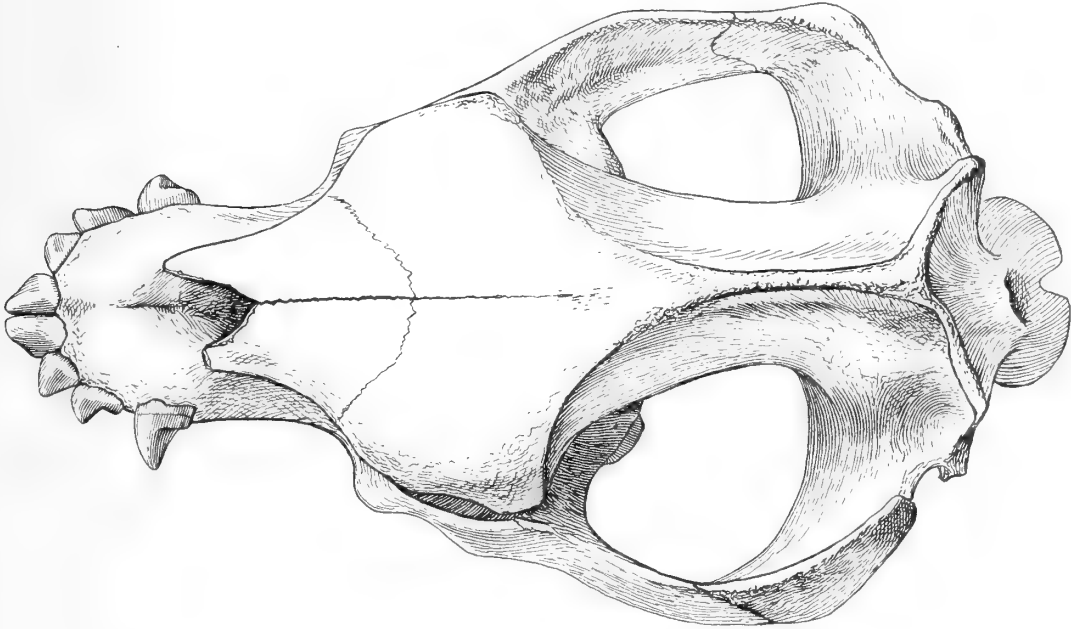


FIG. 1. Superior View of Skull of *T. (?) incisivum* Douglass. ( $\frac{1}{5}$  nat. size.)

but I prefer to place it provisionally here rather than establish another genus. The skull is broad and short, but not high. The forehead is broad and flat. The premaxillaries are oblique, not transverse. The face is short and concave. Apparently there are vacuities anterior to the orbits. Beneath these there is a rounded angle on the malar, but there is no flattened shelf beneath the orbit. The zygomatic arch is spreading and moderately heavy. The sagittal crest is quite high and thin. The superior wings of the occiput are also thin. The brain-case is small; the outward projecting zygomatic processes of the squamosals shelf-like, and broad antero-posteriorly. The paroccipital

processes extend laterally, and are continuous with the paramastoid processes posterior to the external auditory meatus and the postglenoid

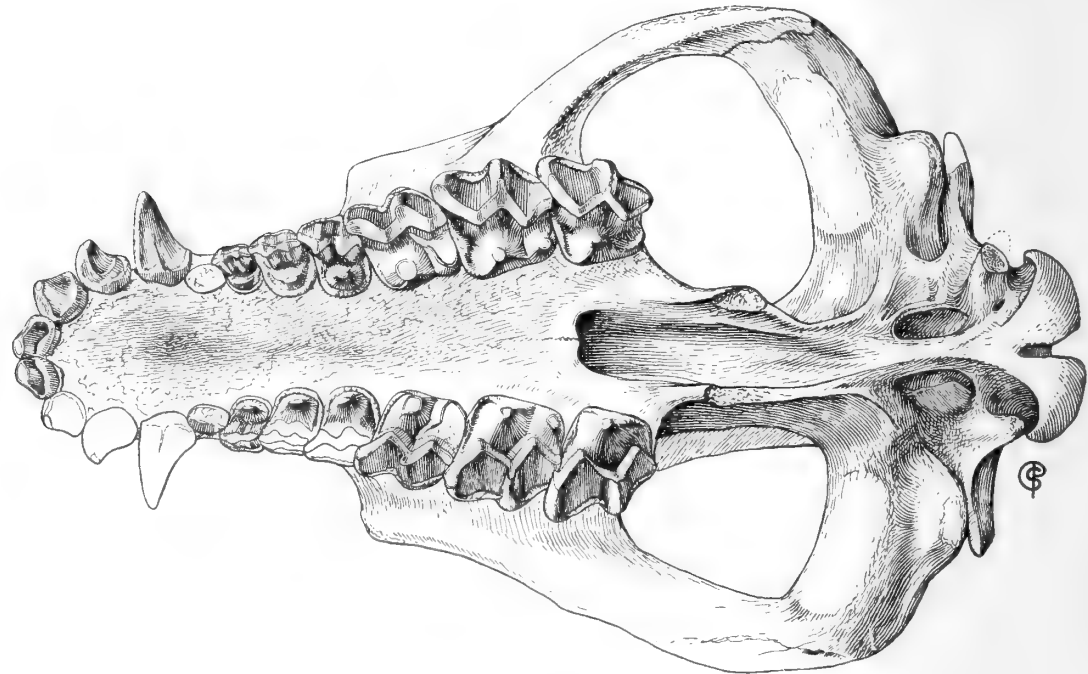


FIG. 2. Palatal View of Skull of *T. (?) incisivum* Douglass. ( $\frac{1}{3}$  nat. size.)

process. The anterior portion of the opening of the posterior nares is between the anterior portions of the last molars. The teeth increase quite regularly in size from  $P^2$  to  $M^2$ . The premolars have

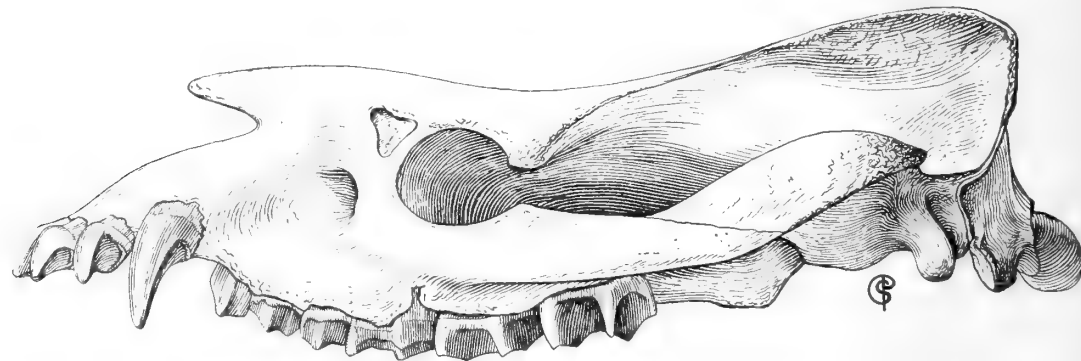


FIG. 3. Lateral View of Skull of *T. (?) incisivum* Douglass. ( $\frac{1}{3}$  nat. size.)

heavy cingula. The deuterococones on  $P^2$  and  $P^3$  are oblong antero-posteriorly while that on  $P^4$  is high and conical.

This skull was discovered by Mr. J. F. Goetschius.

MEASUREMENTS.

	Mm.
Length of skull, basal.....	490
Width of skull.....	330
Length of dental series.....	295

	Mm.
Length of molar-premolar series.....	212
Transverse diameter of I <sup>1</sup> .....	21
Antero-posterior diameter of I <sup>1</sup> .....	22
Transverse diameter of I <sup>2</sup> .....	27
Antero-posterior diameter of I <sup>2</sup> .....	25
Transverse diameter of I <sup>3</sup> .....	22
Antero-posterior diameter of I <sup>3</sup> .....	25
Transverse diameter of canine.....	24
Antero-posterior diameter of canine.....	27
Transverse diameter of P <sup>2</sup> .....	22
Antero-posterior diameter of P <sup>2</sup> .....	20
Transverse diameter of P <sup>3</sup> .....	30
Antero-posterior diameter of P <sup>3</sup> .....	24
Transverse diameter of P <sup>4</sup> .....	37
Antero-posterior diameter of P <sup>4</sup> .....	27
Transverse diameter of M <sup>1</sup> .....	48
Antero-posterior diameter of M <sup>1</sup> .....	44
Transverse diameter of M <sup>2</sup> .....	53
Antero-posterior diameter of M <sup>2</sup> .....	46
Transverse diameter of M <sup>3</sup> .....	53
Antero-posterior diameter of M <sup>3</sup> .....	46

**Manteoceras uintensis** sp. nov.

(PLATE XIII, FIG. 4.)

(No. 2388 Carnegie Museum Catalog of Vertebrate Fossils.)

Skull except posterior portion. Considerably crushed downward and nasals fractured. From gray sandstone in red Uinta beds. Lower portion of horizon "C." About five miles northeast of Well 2, Uinta Basin, Utah.

The skull is high, the forehead broad, and the zygomatic arches spreading. The premaxillary region as seen from the front is broad, though the incisors are only moderately large. The canines are directed outward. The free nasals are short and moderately broad. Apparently the infraorbital foramen is not excessively large. The malar is rounded beneath the orbit and has no protuberance or shelf. The zygomatic arch is not very heavy and is only moderately deep anterior to the glenoid articular surface. It is not nearly so heavy as in *Telmatherium ultimum*. The opening of the posterior nares extends forward to the middle of the second molars. Their border is rounded and thickened.

The incisors are moderately large, but not cupped. They are arranged in an oblique line about half-way between a transverse and

antero-posterior direction. The crowns of  $I^1$  and  $I^2$  are low. The anterior faces are very convex. There are two posterior flattened surfaces separated by a rounded ridge. There are no cups, but the

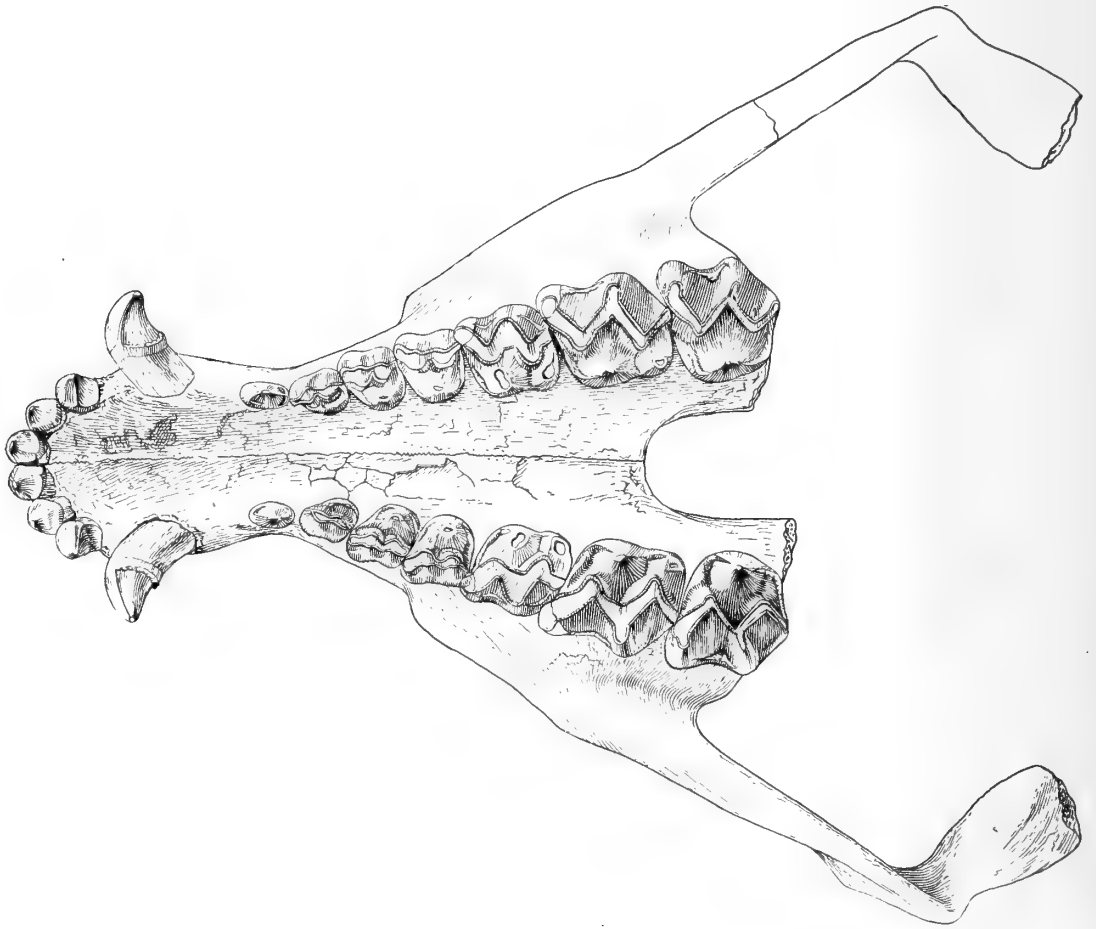


FIG. 4. Palatal View of Skull of *Manteoceras uintensis* Douglass. ( $\frac{1}{3}$  nat. size.)

posterior portion forms a kind of ledge or keel.  $I^3$  is higher and is directed more downward. The posterior portion is flattened and there is a low flat ledge behind the conical cusp. The canine has a moderately high curved crown, on which there are antero-internal and postero-

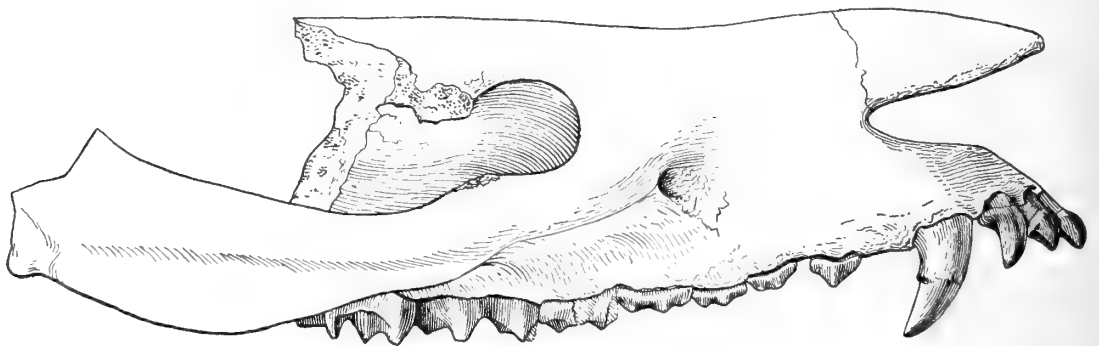


FIG. 5. Lateral View of Skull of *M. uintensis* Douglass. ( $\frac{1}{3}$  nat. size.)



external ridges, passing downward from the base to the apex. There is also a narrow postero-internal ledge.

Unless the skull is more crushed laterally than it appears to be, there is a sudden contraction posterior to the canine, so that the first two premolars are much nearer to the median line of the palate than are the canines. The diastema between the canine and  $P^1$  is about 3 cm. in length.

$P^1$  is a simple oblong conical tooth, which has a small antero-internal depression, and a small ridge passes backward from the apex to the posterior portion of the rudimentary keel. Pms. 2, 3 and 4 have low cusps. The teeth increase nearly uniformly in width and size from  $P^2$  to the last molar. The two outer elements in each are well defined and are sub-equal in size, although the anterior cusp is slightly the larger. The internal cusp on  $P^2$  is small, oblong antero-posteriorly, and is placed far back. The internal cusp on  $P^3$  is much larger, and is crescent-shaped. On  $P^4$  it is more nearly conical. There are rudimentary cingula on the inner faces of the last three premolars. The postero-internal cusp on  $M^3$  is represented by a low crescent-shaped ridge.

## MEASUREMENTS.

	Mm.
Length of skull from anterior portion to glenoid articular surface.....	430
Length of dental series.....	356
Length of molar premolar series.....	247
Length of premolar series.....	106
Length of molar series.....	141
Transverse diameter of $I^1$ .....	16
Antero-posterior diameter of $I^1$ .....	18
Transverse diameter of $I^2$ .....	16
Antero-posterior diameter of $I^2$ .....	18
Transverse diameter of $I^3$ .....	20
Antero-posterior diameter of $I^3$ .....	22
Transverse diameter of canine.....	22
Antero-posterior diameter of canine.....	26
Transverse diameter of $P^1$ .....	12
Antero-posterior diameter of $P^1$ .....	22
Transverse diameter of $P^2$ .....	21
Antero-posterior diameter of $P^2$ .....	28
Transverse diameter of $P^3$ .....	28
Antero-posterior diameter of $P^3$ .....	27
Transverse diameter of $P^4$ .....	33
Antero-posterior diameter of $P^4$ .....	30
Transverse diameter of $M^1$ .....	44
Antero-posterior diameter of $M^1$ .....	40

	Mm.
Transverse diameter of $M^2$ .....	53
Antero-posterior diameter of $M^2$ .....	55
Transverse diameter of $M^3$ .....	56
Antero-posterior diameter of $M^3$ .....	51
Width of palate between canines ?.....	68
Width of palate between first premolars.....	54
Width of palate between last molars.....	83

***Dolichorhinus heterodon* sp. nov.**

(PLATE XIII, FIG. 3.)

(No. 2340 Carnegie Museum Catalog of Vertebrate Fossils.)

From upper part of horizon "B" or lower part of horizon "C," six or seven miles northeast of Well 2, Uinta Basin, Utah.

The skull is long, narrow, and moderately high. The face is short and the brain-case long. The free nasals are long, the posterior opening of the anterior nares extending well backward toward the orbit. The lower border of the nasals approach each other, but this is probably in part due to lateral crushing. The infraorbital foramen is large. The infraorbital shelf is represented by a protuberance, which

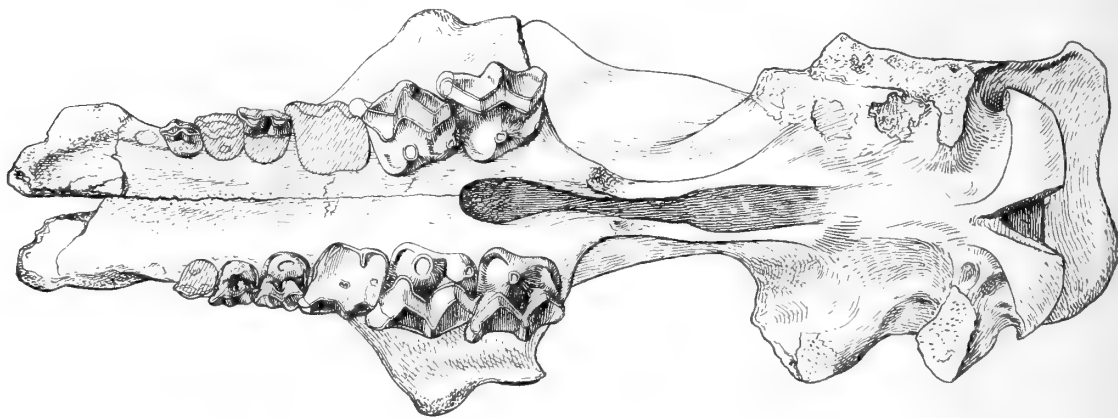


FIG. 6. Palatal View of Skull of *D. heterodon* Douglass. ( $\frac{1}{5}$  nat. size.)

is thickened on the free outer surface. If there were horn-cores above the orbit they were very small. The long brain-case was apparently arched from before backward, the posterior descent to the crest of the occiput being very steep, though this may be somewhat exaggerated by crushing. The occipital condyles are very large. The median portion of the occiput above them is convex while above this there is a large concavity. The postglenoid processes are not excessively large.

The premolars are small, the last being very decidedly smaller than the first molar. The first premolar is not preserved, but it was evidently a simple tooth. In the last three premolars there is a lobe o

buttress on the antero-external portion of the tooth, which makes the anterior margin oblique. The inner cusps (deuterocones) are low with rounded summits. They are more nearly opposite the postero-external than the antero-external cusp. There are inner cingula on  $P^3$  and  $P^4$ . The antero-internal cusp in  $M^2$  is quite high and  $M^1$  conical.

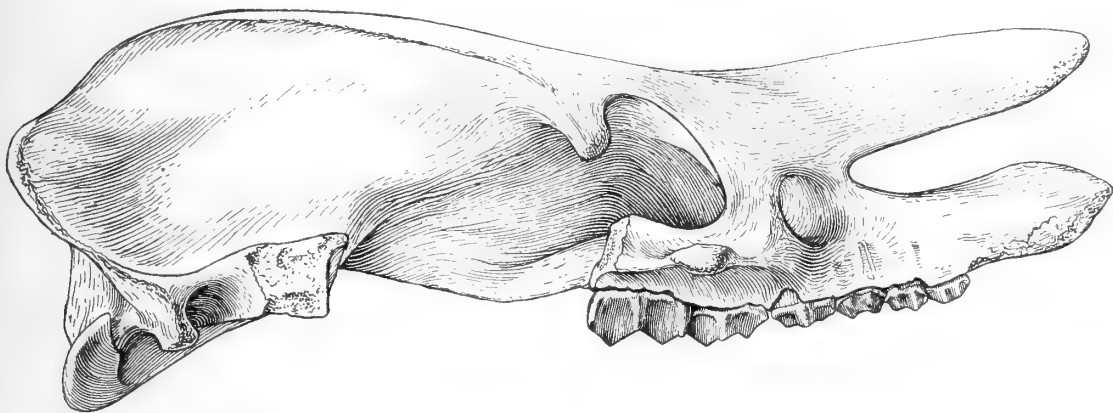


FIG. 7. Lateral View of Skull of *D. heterodon* Douglass. ( $\frac{1}{5}$  nat. size.)

The postero-internal cusp is due simply to an increase in height of the cingulum.

This skull was found by Mr. J. F. Goetschius.

#### MEASUREMENTS.

	Mm.
Total length of top of skull from end of nasals to crest of occiput .....	500
From anterior of orbit to front of nasals.....	160
From anterior of orbit to posterior part of narial opening to front of nasals.	55
Width of occiput.....	128
Height of occiput.....	140
Length of molar premolar series.....	190
Length of premolar series.....	75
Length of molar series.....	115
Length of $P^2$ .....	20
Width of $P^2$ .....	16
Length of $P^3$ .....	21
Width of $P^3$ .....	20
Length of $P^4$ .....	24
Width of $P^4$ .....	27
Length of $M^1$ .....	34
Width of $M^1$ .....	35
Length of $M^2$ .....	46
Width of $M^2$ .....	42
Length of $M^3$ .....	48
Width of $M^3$ .....	42

***Dolichorhinus longiceps* sp. nov.**

(PLATE XIII, FIG. 2; PLATES XIV AND XV.)

(No. 2347 Carnegie Museum Catalog of Vertebrate Fossils.)

From the lowest level at which fossils were found in horizon "B" of the Uinta, about 700 feet below the bottom of the Uinta red beds (horizon "C"), about one and one-half miles east of Well No. 2, Uinta Basin, Utah.

This skull in general outline is very much like that of *Dolichorhinus hyognathus*, though broader. In describing it I prefer to point out

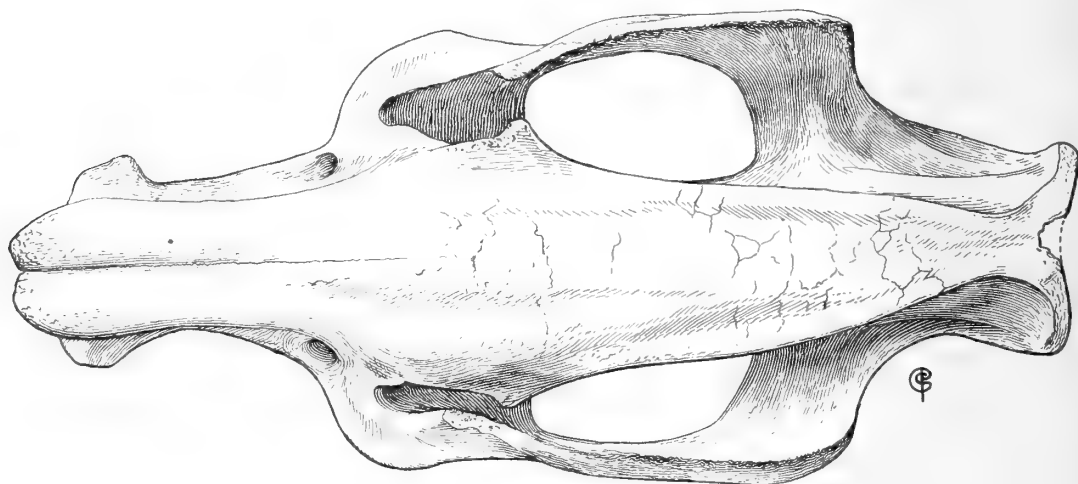


FIG. 8. Superior View of Skull of *D. longiceps* Douglass. ( $\frac{1}{3}$  nat. size.)

the characters which distinguish it from that species. Apparently it is somewhat broader proportionally than that of *D. hyognathus*. The skull is somewhat crushed, but it evidently was not flattened on top. The present specimen had no heavy protuberances or horn-cores, though there may have been the slightest beginning of such. There is a rather narrow shelf, or lateral expansion of the malars, with rounded outer borders, beneath the anterior portion of the orbit, but it is not like the infraorbital process of *D. hyognathus*. The postorbital hook does not appear to have been long or prominent. Evidently the zygomatic arches extend laterally outward more than in the last-named species; the postglenoid processes are not nearly so heavy; the palate is broader; the top of the cranium, though there is no zygomatic arch, becomes narrower anterior to the crest of the occiput.

The teeth are very similar to those of *Dolichorhinus heterodon*, so much so, that, if only the teeth were known, they might be referred to that species. They, as well as the skull, are larger.

## MEASUREMENTS.

	Mm.
Length of top of skull.....	590
Length of free nasals.....	150
Length of skull posterior to anterior portion of orbit.....	393
Width of skull at glenoid articular surface.....	267
Width at infraorbital shelves.....	247
Length of molar premolar series.....	192
Length of premolar series.....	88
Length of molar series.....	112
Length of P <sup>1</sup> .....	15
Width of P <sup>1</sup> .....	11
Length of P <sup>2</sup> .....	20
Width of P <sup>2</sup> .....	20
Length of P <sup>3</sup> .....	24
Width of P <sup>3</sup> .....	25
Length of P <sup>4</sup> .....	27
Width of P <sup>4</sup> .....	31
Length of M <sup>1</sup> .....	30
Width of M <sup>1</sup> about.....	37
Length of M <sup>2</sup> .....	37
Width of M <sup>2</sup> .....	44
Length of M <sup>3</sup> about.....	41
Width of M <sup>3</sup> “.....	43

## VII. AN ANNOTATED LIST OF THE BIRDS OF COSTA RICA INCLUDING COCOS ISLAND.

BY M. A. CARRIKER, JR.

### PREFATORY NOTE.

The nomenclature used throughout this work is the latest and most authentic which I have been able to secure, no names being used unless proposed and approved by the leading ornithologists of this country and Europe. I have followed the rules of nomenclature as adopted by the American Ornithologists' Union, using the Tenth Edition of Linnæus as a basis, and following the system of trinomial names which has been generally adopted by American ornithologists and also by most of the more prominent of the European systematists. There will doubtless be changes made by Mr. Ridgway in the names of the families upon which he has not yet published, but such changes are taking place all the time and are unavoidable.

I have endeavored to cite under each species all references to literature which refers directly to Costa Rican specimens, or to critical notes on the same, whether such specimens came from Costa Rica or not, providing they have a bearing on the name of the species as it is now determined to be.

I have also given all localities at which specimens of each species have been taken when such locality names have not been published in connection with the identical specimens cited. Thus I have cited the specimens in the Collection of the United States National Museum, in Mr. Lankester's Collection, in Mr. Bangs' Collection, and in the Collection of the Carnegie Museum, whenever a record of those specimens has not already been published. Notes on breeding, with descriptions of nests and eggs, are given whenever they are of my own collecting, together with something on the habitat and habits of each species, whenever anything worthy of record has been observed.

I have endeavored to give a brief summary of the history of the ornithology of this most interesting country; a description of the country from a geographical standpoint; something on the distribution of bird-life in general; and a tentative arrangement of the different

life-zones of the country, so far as my experience has enabled me to determine them. With the hope that what I have attempted to set forth in this paper may be of some assistance to students of ornithology, I respectfully submit it to those to whom it may be of interest.

#### GEOGRAPHY AND PHYSIOGRAPHY.

The little Central American Republic of Costa Rica lies almost entirely between the parallels of  $8^{\circ}$  and  $11^{\circ}$  N. Latitude, has an extreme length of two hundred and fifty miles, and an extreme width of one hundred and fifty miles, with an area of about twenty thousand square miles.

The greater portion of the country is very mountainous, there being but narrow coastal plains on both sides, ranging in width from almost nothing to twenty-five or thirty miles in the northeastern part. In fact the whole of the northern portion is comparatively flat and low, draining into the San Juan River and Lake Nicaragua. The drainage system is complicated, large streams being numerous, especially on the Caribbean slope. All these rivers have their sources high in the mountains, are fed by many branches, which, descending rapidly to the coastal plain, usually flow through deep narrow valleys, or gorges, separated from one another by abrupt forest-clad ridges. The divides, or watersheds, are usually very narrow; while in many cases the sources of streams flowing in opposite directions will overlap each other on the divide. The drainage-system can best be understood by consulting the map at the end of this paper.

With few exceptions (these only on the Pacific slope) the whole country was, and still is, to a great extent densely wooded, the forests consisting of a great many species of trees of all sizes, some attaining enormous girth and height. The forests of the whole Caribbean watershed on account of the tremendous rainfall are much denser than those of the Pacific, that is to say, there is a much greater abundance of undergrowth, vines, and small trees, making the problem of penetrating them very serious, and almost impossible without the free use of the machété. On the other hand the forests of the Pacific lowlands are usually quite free of entangling undergrowth, the trees are larger, taller, and closer together, while progress through them is comparatively easy.

The exceptions to the forest conditions are found in the peninsula of Nicoya, or more properly speaking in the region known as Guana-

caste, and in various parts of the Térraba Valley, where, especially in the former region, are great tracts of grass-land or "Sabanas," as they are called, with patches of woodland scattered over them.

Berry- and fruit-trees abound at all altitudes, furnishing food throughout the year for the multitude of fruit-eating tanagers, finches, parrots, toucans, and trogons, while their blossoms give sustenance to a multitude of humming-birds. The tree, which throughout the tropics most attracts humming-birds, is one of the Leguminosæ bearing biennially great masses of fragrant tassel-like blossoms, which persist for some days before fading, while the blossoming extends over a period of more than two months. It is called the "Guava."

The country is divided into two meteorological zones, one embracing the Caribbean watershed, and the other the Central plateau and Pacific watershed. On the Caribbean slope the rainfall is excessive and fairly continuous during the whole year, with an average annual precipitation of from two hundred to two hundred and thirty inches over the lower portions. The seasons of greatest rainfall are from December 15 to January 15, and from June 15 to August 15; while from January 15 to March 15 there is usually very little rain, this being the coolest and most delightful season of the year on the eastern slope. As the higher parts of the watershed (exclusive of the high peaks) are approached, the rainfall becomes less, and conditions prevail, which approach more nearly those of the Pacific slope and Plateau region. In the two last named regions very different conditions exist; there being six months of dry and six months of rainy season, the rains beginning about May 1st and ending with the last of November, while the balance of the year is entirely without rain. During the first and last months of the rainy season the fall is slight, and rarely every day, while during July, August, and October, it is of daily occurrence (during the afternoon only) and often of great violence. During the dry season high winds prevail at all altitudes, but little, if any, wind blows during the wet months.

Influenced by the continuous rain, the vegetation of the eastern slope naturally becomes much more luxuriant and insect-life more abundant than on the Pacific; while bird-life, dependent as it is upon these two sources of food, is naturally very abundant, both as to species and individuals; there being probably not less than three hundred and ninety species and subspecies of land and fresh-water birds found in the lower portion of the Caribbean slope (up to 3,000 feet).



The high peaks, rising above the regions of the central plateau, constitute quite a distinct life-zone, reaching as they do to an altitude of from eight to eleven thousand feet. The principal peaks are the volcanoes, Póas, Barba, Irazú, and Turrialba, grouped together in the central portion of the country, and Pico Blanco and Roválo in the southeastern part, while between these are many unnamed ranges, the summits of which attain an altitude of from seven to eight thousand feet.

The main continental range extends from the extreme northwestern corner, where it is low, to the east central portion, increasing in height and ending in a chain of volcanoes, the last of which is Turrialba. Here there is a break formed by two deep, broad valleys, the Reventazón from the Caribbean and the Rio Grande de Tárcoles from the Pacific, the sources of which are within a half mile of each other at the narrow divide known as "El Alto," which has an elevation of but five thousand feet.

Practically the whole of the country to the southeast of these valleys is an unbroken expanse of mountain, valley, river, and jungle, with few inhabitants, except the nondescript and rapidly diminishing Indians. There are no reliable maps of the region and but little is known concerning the avifauna outside of the Sicsola Valley on the Caribbean and the Térraba Valley on the Pacific slope.

On the western side are several more or less isolated groups of mountains, ranging in altitude from four to eight thousand feet, the principal being the Cerro de Santa Maria (2,000 to 4,000 feet) in the upper part of Guanacaste; the Aguacate Mountains, lying just back of Puntarenas (2,000 to 5,000 feet); the Dota Mountains, farther to the south (2,000 to 8,000 feet); another (unnamed) lying between the Rio Grande de Térraba and the Pacific coast and lastly a small range in the Peninsula de Osa, outside the Golfo Dulce.

The principal rivers of the Caribbean slope are the Zapote, Frio, San Carlos, Sarapiquí, Súcio, and Tóro Amarillo, emptying directly or indirectly into Lake Nicaragua or the San Juan River, while the Reventazón, Pacuare, Matina, Banana, Estrella, and Sicsola empty into the Caribbean. On the Pacific slope the streams are fewer, but larger. North of the Gulf of Nicoya there is but one of any importance, the Tempisque, which drains the whole of the northwestern portion of the country and empties into the head of the Gulf of Nicoya. The Barranca and Grande de Tárcoles empty into the eastern

side of the Gulf, while south of that come the Grande de Pirrís and lastly the Diquís or Rio Grande de Térraba, which drains a very large area, and is the only Costa Rican River with a delta, having five mouths opening directly into the Pacific Ocean.

#### THE LIFE-ZONES.

In attempting a study and definition of the life-zones of this region and their proper correlation with those of North and South America, almost insurmountable obstacles are encountered in the beginning, because of our exceedingly fragmentary knowledge of the local distribution of life in Costa Rica. It is quite true that we have fairly complete lists of the birds, mammals, and plants of most of the Central American countries, but so little importance has been attached by collectors in general to the significance of altitude and humidity, that very little has been recorded which tends to throw light on some of the more obscure points. Carelessness in labelling has tended to render matters more confusing.

There is no question that Dr. Merriam has solved the fundamental problems of the distribution of life and the life-zones in North America, and his scheme is certainly the most satisfactory and feasible yet advanced. It is also quite certain that the distribution of a portion of the bird-life of Central America, with respect to altitude, has a direct correlation with the life-zones of North America. In Central America, however, we have a much more complicated state of affairs than in North America. Here are to be found representatives of the three great primal groups, which constitute the fauna of the northern half of the western hemisphere, the Boreal, the Sonoran, and the Tropical, the first two coming down from the north and the last coming up from the south, and all overlapping in Costa Rica. Some zones or belts of the Tropical occupy exactly the same ground as some of the Sonoran, so that it is only by studying the affinities of the various species and determining whether they are modified Tropical or Sonoran forms, that we are able to account for their presence in certain regions and give a reasonable explanation of the finding of two widely different types in apparently the same zone.

It is therefore with the hope of stimulating investigation along these lines that the present tentative outline of the different life-areas, their origin and affinities, is attempted. The present uncertainty in regard to the real position of some of the neotropical species only adds to the

difficulty, while some of the well known, wide-ranging species cannot be classed as characteristic of any one zone, it even being very uncertain whether they have originated from the Tropical or Boreal faunas.

The geographical position and meteorological peculiarities of Costa Rica make possible the presence of the enormous bird-fauna to be found within its confines, at the same time greatly increase the difficulty of a satisfactory disposition of many of the species with respect to the life-zones. The continent has narrowed down from three thousand miles in breadth to scarcely more than sixty at the narrowest part of Costa Rica, while within that sixty miles are crowded a diversity of climatic conditions, humidity, and altitudes scarcely to be paralleled on the face of the globe.

The northern and southern forms of the Pacific and Caribbean lowlands here meet, and overlap; an arm of the Sonoran occupies the central plateau, a single remnant of the Canadian persists on the isolated peaks of a few high mountains, while the Tropical forms contest nearly all the territory with the Sonoran. With such a multitude of species and with so many diverse conditions brought into such close proximity, it is very evident that there must be a continual struggle for ascendancy between the types of the various life-zones, that many highly specialized forms only persist within their respective areas, while others more plastic, have adapted themselves to a wide diversity of environment and are to be found ranging over the whole of the respective zones of which they are typical, as well as penetrating into adjacent territory. Thus may be explained the persistent overlapping of birds from one zone in another and the presence of the so-called neutral belt lying between them. In defining these zones, these wide-ranging species must be quite ignored, and only those considered the ranges of which are limited to regions having some physical characteristic not found beyond that immediate locality, such as temperature, altitude, or humidity.

The fact that certain zones extend to lower altitudes in some places than at others is largely influenced by "slope exposure." Where the slope of the mountain range is abrupt, from a point near sea-level, without intervening foothills or table-land, we find the Cordilleran forms descending to much lower altitudes than where such obstacles intervene, these hills or table-lands, when present, always tending to warm the slope to a higher altitude than would otherwise be the case. Localities with, or without, these conditions can be compared only

when on the same side of the continental divide, because conditions of humidity are so different on the Pacific slope from those on the Caribbean. While the slope is much more gradual on the western side than on the eastern, the humidity is so much lower, that no rational comparison can be made.

Taking into consideration all of these factors, we may make the following classification of the life-zones and give some of the species most characteristic of each.

Primary Areas.	Regions.	Zones or Belts.	Altitude (Feet).
Boreal.....	Boreal.....	Canadian.....	10,000 to 11,000
Sonoran.....	Upper Sonoran.....	Sub-Timberline.....	8,000 to 10,000
		Upper Plateau.....	5,000 to 8,000
	Lower Sonoran.....	Lower Plateau.....	2,500 to 5,000
		Plains Region.....	100 to 2,500
Tropical.....	Humid.....	Tropic.....	0 to 1,500
		Sub-Tropic.....	1,500 to 4,000
		Cordilleran.....	4,000 to 7,000
		Sub-Andean.....	7,000 to 10,000
	Semi-Arid.....	North Coastal.....	0 to 1,200
		South Coastal.....	0 to 1,200
		Foot Hills.....	1,200 to 4,000
		Cordilleran.....	4,000 to 7,000
		Sub-Andean (extralimital)	
	Arid (extralimital)		

#### CANADIAN ZONE (10,000 to 11,000 feet).

The only portion of Costa Rica which we can class under this head is the region above timber-line on the high volcanoes. Here in this bleak, cool region, where the only vegetation consists of scrubby bushes and shrubs, lives the sole remnant of the Canadian fauna, *Junco vulcani*.

#### SUB-TIMBERLINE BELT (8,000 to 10,000 feet).

Between the altitudes of about 8,000 and 10,000 feet lies a belt of hard-wood forest containing many oaks and other trees characteristic of the more northern arboreal flora. These trees are not tall, are more or less spreading, and toward the upper portion of the zone become stunted and gnarled from the low temperature and high winds often prevailing. In this belt are found numerous characteristic species which seldom go below it. On the higher peaks it does not extend so low as on some of the lower ranges, for example on the volcanoes

Irazú and Turrialba the birds characteristic of it are seldom met with below 8,500 feet, while on Póas, Barba, and on the Dota Mountains and the Talamanca Cordillera, wherever the summits reach the height of about 7,500 feet, some, but not all, of the characteristic forms are found. The following species, all of which I believe are related to the Sonoran and not to the Tropical, are rarely to be met with outside of this belt: *Catharus frantzii*, *C. gracilirostris gracilirostris*, *Planesticus nigrescens*, *Troglodytes ochraceus*, *Oreothlypis gutturalis*, *Myioborus torquatus*, *Vireo carmioli*, *Ptilogonys caudatus*, *Phainoptila melanoxantha*, *Empidonax atriceps*, *Selasphorus flammula*, *Melanerpes formicivorus striatipectus*, *Dryobates villosus extimus*.

#### UPPER PLATEAU (5,000 to 8,000 feet).

This zone is in many ways similar to the Sub-Timberline, except that it is warmer, less humid, and has a larger and more varied fauna. It contains many species also found in the Lower Plateau belt, but nevertheless has some forms characteristic of it.

*Catharus fuscater hellmayri*, *Planesticus plebejus*, *Myiadestes melanops*, *Pheucticus tibialis*, and perhaps other forms, the origin of which is rather obscure, may be referred to this belt.

#### LOWER PLATEAU (2,500 to 5,000 feet).

The Lower Plateau belt includes the whole of what is commonly known as the central plateau region or the Highlands of Costa Rica, and is characterized by several large valleys and plateau areas, all originally forested, but long since cleared in many parts and devoted to agriculture, pastures, etc. This belt extends much lower on the Pacific slope than on the Caribbean, as do all the Sonoran zones, while with those of the Tropical Area, the reverse is the case. Some of the characteristic species of the zone are: *Catharus melpomene costaricensis*, *Planesticus tristis leucauchen*, *Vireo josephæ costaricensis*, *Piranga testacea testacea*, *Melozone leucotis*, *M. cabanisi*, *Psilorhinus mexicanus cyanogenys*, *Myiodynastes luteiventris*, *Legatus albicollis*, *Empidonax flavescens*, *Nomonyx dominicus*.

#### PLAINS REGION (100 to 2,500 feet).

The Sonoran Plains Region fauna is practically confined to the Pacific slope, there being but few species of true Sonoran origin which are found on the Caribbean below 2,500 feet. It is also confined al-

most wholly to the northwestern portion of the country, including the Nicoya peninsula and the eastern mainland slope of the Gulf, but does not extend south of the Rio Grande de Tárcoles Valley, with very few exceptions. It is further characterized by a six months' dry season, and by the presence of large areas of savanna, which are confined to the region northwest of the Gulf of Nicoya.

The most characteristic forms are: *Catharus griseiceps* (south of Rio Grande), *Planesticus tristis cnephosa*, *Heleodytes capistratus capistratus*, *Salpinctes guttatus*, *Oryzoborus funereus*, *Amaurospiza concolor*, *Coturniculus savannarum obscurus*, *Aimophila ruficauda ruficauda*, *A. botterii sartorii*, *A. rufescens hypæthrus*, *Agelaius phæniceus* subsp.? *Icterus sclateri*, *I. pectoralis espinachi*, *Calocitta formosa azurea*, *Myiodynastes maculatus nobilis*, *Myiarchus* (several species); all of which are confined to the Pacific. On the Caribbean are found: *Catharus mexicanus fumosus*, *Heleodytes zonatus costaricensis*, *Planesticus obsoletus*, *Icterus mesomelas salvini*, and *I. prothemelas*.

#### TROPICAL.

All of the forms under this head, whether in the humid, semi-arid, or arid regions are supposed to be true Tropical forms or to be slightly aberrant types of the Tropical fauna, which have spread northward from the equatorial regions.

#### TROPIC ZONE (0 to 1,500 feet).

This zone is confined to the Caribbean slope, embracing the whole of the lowlands and lower foot-hills, and is characterized by a very heavy, nearly continuous rainfall, luxuriant tropical jungles, composed of plants and trees belonging entirely to the tropical flora. Practically all the birds found here are species inhabiting woodland. Some are found in the Pacific lowlands, others are represented there by slightly different races, while many are peculiar to this belt. Some of the most characteristic species are: *Leucolepis lawrencii*, *Henicorhina prosthelleuca prosthelleuca*, *Thryophilus zeledoni*, *T. thoracicus*, *T. castaneus costaricensis*, *Pheugopedius atrogularis*, *Vireolanius pulchellus verticalis*, *Euphonia gouldi*, *Tangara florida*, *T. lavinia lavinia*, *T. larvata larvata*, *Buthraupis cæruleigularis*, *Phænicothraupis fuscicauda*, *Lanio leucothorax*, *Mitrospingus cassini*, *Tachyphonus delatirii*, *Pitylus grossus*, *Caryothraustes poliogaster scapularis*, *Cyanocorax affinis zeledoni*, *Copurus leuconotus*, *Todirostrum nigriceps*, *Perissotriccus atricapillus*,

*Aphantotriccus capitalis*, *Rhynchocyclus marginatus*, *Corapipo altera altera*, *Manacus candei*, *Pachyrhamphus cinnamomeus*, *Laniocera rufescens*, *Microticcus brunneicapillus*, *Cotinga amabilis*, *Carpodectes nitidus*, *Hyloctistes virgatus*, *Automolus cervinigularis hypophæus*, *Sclerurus guatemalensis*, *Dendrocincla ridgwayi ridgwayi*, *Xiphorhynchus punctigula*, *Thamnophilus nævius atrinucha*, *Dysithamnus striaticeps*, *Myrmotherula fulviventris*, *M. melæna*, *Ramphocænus semitorquatus*, *Gymnocichla cheiroleuca*, *Myrmeciza exsul exsul*, *M. læmosticta*, *Phænostictus macleannani saturata*, *Pittasoma michleri zeledoni*, *Hylopezus intermedius*, *Grallaricula flavirostris costaricensis*, *Microchera parvirostris*, *Agyrtria amabilis amabilis*, *Threnetes ruckeri*, *Prymnacantha conversi*, *Celeus loricatus*, *C. castaneus*, *Veniliornis caboti*, *Urospatha martii*, *Prionornis platyrhynchus*, *Trogon clathratus*, *Jacamerops aurea*, *Bucco dysoni*, *Monasa grandior*, *Ara ambigua*, *Conurus aztec*, *Leptotila cassini vinaceiventris*, *Geotrygon veraguensis*, *Odontophorus melanotis*, *Heliornis fulica*, *Eurypyga major*.

#### SUB-TROPIC ZONE (1,500 to 4,000 feet).

Conditions in this belt are practically the same as in the Tropic except that the temperature is lower. Fewer characteristic species are found in this belt, it containing many neutral forms. Some of the most characteristic are: *Microcerculus lusciniæ*, *Euphonia anneæ*, *Ramphocelus passerinii* (also in preceding zone), *Chlorothraupis carmioli*, *Chlorospingus olivaceiceps*, *Lysurus crassirostris*, *Saltator grandis*, *S. atriceps lacertosus*, *S. magnoides medianus*, *Platytriccus albogularis*, *Lophotriccus squamæcristatus minor*, *Acrorchilus erythrops rufigenis*, *Sclerurus canigularis*, *Dysithamnus mentalis septentrionalis*, *Formicarius nigricapillus*, *F. rufipectus*, *Grallaria princeps*, *Hylopezus dives*, *Oreopyra castaneiventris calolæma*, *Phaethornis guy coruscus*, *Chloro-nerpes yucatanensis*, *Momotus lessoni*, *Trogon puella*, *Selenidera spectabilis*, *Aulacorhamphus cæruleigularis*, *Pionopsittacus hæmatotis*, *Bolborhynchus lineolus*, *Odontophorus leucolemus*, *Dendrortyx hypospodius*.

#### CORDILLERAN ZONE (4,000 to 7,000 feet).

Here we have the same conditions as in the Upper Plateau described under the Sonoran, but the birds here given are those of Tropical origin, which through gradual acclimatization have accustomed themselves to the cooler temperature of this altitude, and contest this territory with the Sonoran fauna.

*Chlorophonia callophrys*, *Tangara dowi*, *Chlorospingus regionalis*, *Atlapetes gutturalis*, *Cyanolyca cucullata*, *Elænia martinica subpagana*, *Pachyrhamphus versicolor costaricensis*, *Rhopoctites rufobrunneus*, *Oreopyra cinereicauda*, *Eugenes spectabilis*, *Campylopterus hemileucurus*, *Colibri cyanotis*, *Pyrrhura hoffmanni hoffmanni*, *Claravis mondetoura*, *Geotrygon costaricensis*, *G. chiriquensis*, *Nothocercus frantzii*.

#### SUB-ANDEAN BELT (7,000 to 10,000 feet).

The Sub-Andean corresponds to the Sub-Timberline of the Sonoran, except that it extends about 1,000 feet lower. Its characteristic species are: *Thryorchilus browni ridgwayi*, *Basileuterus melanotis*, *B. melanogenys*, *Diglossa plumbea*, *Chlorospingus pileatus*, *C. zeledoni*, *Buarremon brunneinucha*, *Pezopetes capitalis*, *Acanthidops bairdi*, *Pseudocolaptes lawrencii*, *Margarornis rubiginosa*, *Premnoplex brunescens brunneicauda*, *Scytalopus argentifrons*, *Zeledonia coronata*, *Panterpe insignis*, *Anrostomus saturatus*, *Pharomacrus mocinno costaricensis*, *Columba albilinea crissalis*, *Chamæpetes unicolor*, *Odontophorus guttatus*, *O. veraguensis*.

#### NORTH-COASTAL ZONE (Pacific — 0 to 1,200 feet).

This Zone covers the lower portion of the northern half of the Sonoran Plains Region, and includes the lower portions of the Nicoya Peninsula, Guanacaste, and the Pacific mainland slope of the Gulf of Nicoya. It is, for the most part, covered with heavy timber, which holds the moisture somewhat during the dry months. There are many species which inhabit both the North Coastal and the South Coastal regions and also the Caribbean Tropic Zone. There are others found only in the two Pacific belts, and still another group found only in the South Coastal Belt, but there are few strictly tropical birds found in the North Coastal region, which are not also found in the South Coastal. In other words nearly all of the species peculiar to the region included in the North Coastal are of Sonoran affinities and are placed under the Sonoran Plains Region. Those peculiar to this belt which are strictly of tropical origin are: *Thryophilus pleurostictus rarus*, *T. rufalbus castanonotus*, *Dendrocincla homochroa acedesta*, *Amazilis cinnamomea*, *Tapera nævius*, *Morococcyx erythropygus*, *Hylomanes momotula*, *Eumomota superciliaris australis*, and *Crypturus cinnamomeus*.



## SOUTH COASTAL ZONE (Pacific — 0 to 1,200 feet).

The South Coastal Belt embraces the portion of the Pacific lowlands and foothills lying south of the valley of the Rio Grande de Tárcoles. It is for the most part densely forested, but contains some considerable tracts of savanna in the southern part, *i. e.*, in the Térraba Valley. In this region are found some species which have worked up the coast from Panama and Chiriquí, entering into Costa Rica only as far as the northern boundary of the belt, or in some cases only as far north as the head of the Térraba Valley. The species peculiar to the region are: *Pheugopedius hyperythrus* (a few straggle farther north), *P. fasciatoventris melanogaster*, *Thryophilus semibadius*, *Basileuterus leucopygius veraguensis*, *Vireolanius pulchellus viridiceps*, *Ramphocelus costaricensis*, *Lanio melanopygius*, *Tachyphonus nitidissimus*, *Saltator striatipectus isthmicus*, *S. intermedius*, *Todirostrum schistaceiceps*, *Elænia chiriquensis*, *Myiozetetes texensis colombianus*, *Myiophobus fasciatus fufurosus*, *Manacus aurantiacus*, *Pipra velutina*, *Corapipo altera albi-barba*, *Cotinga ridgwayi*, *Carpodectes antoniae*, *Synallaxis albescens latitabunda*, *Automolus pallidigularis exsertus*, *Dendrocincla anabatina saturata*, *Deconychura typica*, *Dendrocolaptes sancti-thomæ hesperius*, *Thamnophilus bridgesi*, *Gymnocichla nudiceps erratilis*, *Myrmeciza occidentalis*, *Formicarius hoffmanni*, *Hylopezus lizanoi*, *Agyrtria boucardi*, *Agyrtria amabilis decora*, *Veniliornis neglectus*, *Melanerpes chrysauchen*, *M. wagleri*, *Picumnus olivaceus flavotinctus*, *Trogon bairdi*, *Dromococcyx phasianellus*, *Chæmepelia minuta*, *Leptotila verreauxi*, *Odontophorus castigatus*, *Creciscus albigularis*, *Tinamus castaneiceps*.

## FOOT HILL BELT (1,200 to 4,000 feet).

Although much drier than the Sub-Tropic Belt, the bird-fauna does not greatly differ, except that there are a great many species in that zone not found here, but most of those taken in the Foot Hill Belt are present in the Sub-Tropic Zone. In fact it may be said to have no very distinctive fauna of its own (tropical fauna), being rather a neutral belt. Its birds are to a great extent of the Sonoran also, or else those forms which cannot be classed as characteristic of any special zone.

## CORDILLERAN BELT (Semi-Arid).

The Cordilleran Belt of the Semi-Arid Zone is practically the same as that belt in the Humid Zone, except that it has a smaller percentage of tropical forms, being in reality occupied mostly by the Sonoran

fauna, or else by species of the Tropical which are more elastic, adapting themselves to the different environments caused by the periodical rainy and dry seasons.

#### ALTITUDINAL MIGRATION OF RESIDENT SPECIES.

A peculiar phenomenon, affecting the problem of the distribution of a considerable number of resident birds, is the seasonal migration from higher to lower altitudes and the congregation of certain species into a small area where their favorite food is found in abundance. The only species known to make these migrations are some of the fruit-eating tanagers, and some of the cotingas and honey-creepers, and there can be no question that the descent into lower regions is made in search of certain fruits and berries which ripen at those times and of which the birds are very fond. Perhaps one of the most marked is that of the bell-bird (*Procnias tricarunculata*), which is normally a resident and breeds in the Cordilleran and sub-Andean Zones. About the first of December they begin to drift into the Caribbean lowlands, becoming very abundant in the upper part of the Humid-Tropic Zone (600 to 1,500 feet), where they remain until late in February, feeding upon a small nut-like fruit.

Other examples are *Euphonia minuta* and *E. luteicapilla*, which come down earlier and stay longer, appearing in large numbers in the vicinity of Carrillo in September, gradually working their way into the lowlands, until in December they were quite common about El Hogar, in company with *Dacnis venusta* and *Cyanerpes lucidus*, which are never seen in that region at any other time of the year. *Tangara icterocephala*, *T. guttata chrysophrys*, *T. florida* and *T. gyroloides* also appear in considerable numbers during August and September in the lower part of the Rio Súcio gorge, in the vicinity of Carrillo, while *Tangara dowi* comes down as far as La Hondura (3,500 feet) in great numbers. Little or nothing is known concerning the range of *Tangara florida* and *T. icterocephala*, beyond the fact that they are found in the vicinity of Carrillo at certain times of the year, but it is quite probable that they breed in the dense forests of the foot-hills in that vicinity at an altitude of from 2,000 to 4,000 feet, congregating in the lower gorge to feed on a small berry-like fruit abundant during August and September. However *T. guttata* and *T. gyroloides* are species of wider range and are met with during the breeding season at much higher altitudes, while I found *T. dowi* abundant late in October in the Sub-Andean Zone of the Volcano Turrialba.

On the Pacific coast the same phenomenon is observed among some of the above-mentioned species and others nearly related, but just what these are, I was never able to learn positively, not having the opportunity of collecting in that region at the time of the ripening of the fruit which is said to attract them in large numbers.

#### ON THE HABITS OF NORTH AMERICAN WINTER VISITORS.

Strange as it may seem, the North American migrants, upon their arrival in Costa Rica, distribute themselves in a most unaccountable manner. *Myiochanes virens* and *M. richardsoni* are to be met with almost anywhere from sea-level up to 9,000 or 10,000 feet on the Volcanoes de Irazú and Turrialba. On the other hand, *Nuttallornis* is seldom seen below 5,000 or 6,000 feet, and is most abundant between 8,000 and 10,000 feet. *Empidonax flaviventris* and *E. trailli* range from sea-level up to 3,500 feet. At least one of the *Mniotiltidæ*, *Wilsonia pusilla*, is found from near sea-level to timber-line, others from the lowlands up to 4,000 or 5,000 feet, while some are only seen on the central plateau. *Guiraca cærulea* seems to be confined almost entirely to the Pacific lowlands. *Zamelodia ludoviciana* has only been recorded from the Caribbean slope and central plateau, while *Spiza americana* ranges from ocean to ocean, up to 4,000 or 5,000 feet. *Passerina cyanea* seems confined to the highlands. Ducks, some shore-birds, and herons are found at all altitudes, where suitable conditions are to be met with.

One would naturally look for *Nuttallornis borealis* at a high altitude, it being a bird of the Canadian fauna, but why should *Myiochanes* range from sea-level to 9,000 feet, or why should *Empidonax flaviventris* and *E. trailli* be found in the Humid-Tropic and Sub-Tropic Zones, when they breed over practically the same territory as *Nuttallornis*? Perhaps by an exhaustive study of the food of these birds both in their breeding haunts and in their winter ranges, a reason might be found for this peculiar distribution, or perhaps it is only another of those inexplicable problems so often met with.

The migrants in their winter haunts are usually found in localities having the same general character as those which they frequent in the north. Their habits, too, are quite similar, with the exception that they are almost invariably as silent as so many shadows. Never to my recollection have I ever heard a migrant attempt a song, while but few go as far as uttering a feeble chirp, with the exception of *Icterus gal-*

*bula*, *Dendroica coronata*, the swallows, *Botaurus lentiginosus*, the ducks, and some of the shore-birds.

This peculiarity makes collecting them very difficult, especially the warblers and thrushes, which may be common enough high up in the tree-tops or hidden away in the thick forests, but which rarely come out into the open, except such species as *Dendroica aestiva*, *D. pennsylvanica*, *Wilsonia pusilla*, and *Setophaga ruticilla*.

#### GENERAL NOTES ON THE HABITS OF THE RESIDENT SPECIES.

Taken as a whole the birds belonging to, or offshoots of, the Sonoran fauna do not differ very materially from those farther north, with respect to their habits, food, song, breeding, etc. It is chiefly among the representatives of the Tropical fauna that peculiar forms are to be met, and where specialization has been carried to a remarkable extent in some species and genera. Many species are never to be found outside of the dark, wet jungles of the Caribbean lowlands, or the chilly, rain-soaked mountain-slopes. Some never leave the ground, except for a low short flight when suddenly flushed; while others never seem to go near the ground. With the exception of the wrens, few birds belonging to the Tropical fauna are endowed with the power of song. It is true that some have a pleasing, musical call, but they are not songsters, while the great bulk of the *Dendrocolaptidæ*, *Trogonidæ*, *Pipridæ*, *Cotingidæ*, *Trochilidæ*, *Ramphastidæ*, *Momotidæ*, *Galbulidæ* are not only without song, but many scarcely even chirp, or if so, in a harsh discordant key. It is also noticeable that the vocal powers decrease in about the same ratio as the plumage increases in brilliancy, of which type the trogons are good examples.

Contrary to the usual impression, birds inhabiting the impenetrable jungles, where perhaps many never see a human being in the course of their lives, are extremely shy and hard to approach, while those found in the settled districts and near the haunts of man are quite indifferent to his presence. Thus it would seem that fear in birds is inspired by things which they have not been accustomed to seeing rather than by those things which we would naturally suppose would be a fear-inspiring object to them. Sudden movement or sharp sounds will also frighten most birds more than the mere quiet presence of an unaccustomed object, and, after being frightened away precipitately by the sudden noisy approach of the collector, they will stealthily return to have a look at the curious object, should he remain perfectly quiet. Often

while standing perfectly still in the forest I have heard the rapid whirr of wings, and, turning cautiously, have seen a humming-bird poised within a yard or two of my head, now advancing, now retreating, and all the while turning its tiny head from side to side in its efforts to solve the identity of the curious creature which has invaded its domain. At the slightest movement of head or arm it is gone like a flash, and many have been the rare humming-birds which I have seen thus, never to see again in the same locality. *Phaethornis longirostris*, *P. guy coruscus*, *P. adolphi*, *Oreopyra cinereicauda*, *Threnetes ruckeri*, *Chalybura melanorrhoa*, *Microchera parvirostris*, and *Thalurania colombica* are much addicted to this habit.

All the terrestrial *Formicariidæ* are very shy, and some would be almost impossible to collect in any numbers were it not for the curious habit they have of answering to their call when skillfully imitated by the collector, who may call them to his very feet in this manner; but, like the humming-birds, at the first movement they disappear and cannot be called back.

The birds of the jungle have another curious habit, that of collecting in little bands and moving here and there through the forest in search of food. The collector may walk for an hour or more and scarcely see a bird, when he will suddenly find himself in the midst of a crowd of tanagers, warblers, vireos, and arboreal ant-thrushes, which are flitting along, all in the same direction, now high up in the trees, now low down, chirping and twittering as they search for food. After a few quick shots all will have disappeared and again the forest is silent and deserted. Ant-thrushes, some of the tree-creepers, and insect-eating tanagers are very fond of following in the wake of a swarm of migrating ants, picking up the stragglers as they stream over the ground and up the small trees and shrubs. At this time they are quite silent, and, when disturbed, sneak off abruptly, only to return shortly to the feast. If one can put up with the fierce bites of the ants many rare things may be taken on such occasions.

There is another state of affairs which always impresses the collector and which cannot always be satisfactorily explained. This is the apparent scarcity of certain species and abundance of others. Why should ant-thrushes such as *Formicarius nigricapillus*, *F. castaneiceps*, *Pittasoma michleri zeledoni*, *Grallaria guatemalensis princeps*, and *Hylopezus dives* be so extremely hard to find, while *Formicarius umbrosus*, *F. moniliger hoffmani*, *Hylopezus lizanoi*, and *H. intermedius*

are always abundant in the localities suitable to their habits? Or why should certain cotingas as *Pachyrhamphus versicolor costaricensis*, *Platypsaris aglaia*, and *Laniocera rufescens* be almost impossible to collect, while *Lathria unirufa clara*, *Procnias tricarunculata*, *Querula cruenta*, and others are met with in large numbers throughout their range? Is it because Costa Rica lies on the edge of their range, or are they nowhere to be found in abundance?

The first hypothesis doubtless explains the rarity of a few species in Costa Rica, but there are others which are not only rare in Costa Rica, but are few in numbers or entirely wanting in all other places, together with their near relatives. I believe there are three explanations of this scarcity, each applying to different species:

*First*, there are some species which to all appearances are rare, but in reality are not so, their habitat being in places inaccessible or easily overlooked on account of their retiring habits: For example, I think it very probable that some of the cotingas, being almost entirely fruit-eaters, rarely descend to a point below the tops of the tall forest-trees, and in consequence are impossible to be seen from the ground beneath. Others inhabit the almost impenetrable jungle of the Caribbean lowlands, such as *Gymnocichla cheiroleuca* and *Phænostictus macleannani saturatus*, which are rarely seen outside of the dense growths of wild plantains and cane found so abundantly in those regions. *Second*, some species have a most extraordinarily local range, and may be fairly abundant in one small locality, but the collector may never happen to locate this spot, or may only approach the edge of it, where he will pick up a few stragglers. Such birds as *Agyrtria boucardi*, *Tangara florida*, *T. icterocephala*, *Buthraupis cæruleigularis*, *Myrmelastes læmostictus*, *Catharus mexicanus*, *Thryorchilus ridgwayi*, and *Eutoxeres aquila heterura* belong to this group. *Third*, there are some species the apparent rarity of which can be explained from none of the above causes and it seems to me that there remains but one possible explanation, that is, that they belong to a vanishing fauna, and for reasons of high specialization, interbreeding, or inability to hold their own in the ever present struggle for the survival of the fittest, are slowly disappearing. *Formicarius rufpectus* and its allies, found in Panama, Ecuador, and Colombia are splendid illustrations of this group, as are also *Leucopternis princeps*, *Formicarius nigricapillus*, *Pittasoma michleri*, *Grallari-cula flavirostris*, *Xiphocolaptes emigrans*, *Pseudocolaptes lawrencii*, *Troglodytes ochraceus*, and others. Types of this group are met with

in almost all of the families, but they seem to be commoner among the ant-thrushes, tree-creepers, and humming-birds.

With the destruction of the tropical forests, many of the most interesting and by far the larger percentage of the typically tropical forms of bird-life are in danger of extermination. Those highly specialized forms, found only in the cool dark depths of the forest cannot possibly adapt themselves to the condition of affairs brought about by the removal of the virgin forest and their doom is certain. There is no immediate danger of such a fate, but it will ultimately come, and unless thorough work is soon done in some regions, many rare and interesting species will disappear, leaving very little knowledge of their life-history and habits.

#### HABITS, FOOD, AND SONG AS FACTORS IN NOMENCLATURE.

In some respects it is unfortunate that some of the men who have done the most work in the systematic arrangement of the birds, have had so little experience in the field, and know so little about the habitat, actions, and song of the many tropical forms which have always proposed vexing problems to the systematist. It seems to me that too much importance has been attached to some slight differences in physical structure and that some characters have been used for separating the higher groups which are subject to much variation in apparently closely related forms.

Naturally a bird must be placed somewhere in the great system of classification which has been built up by scientists, and characters more or less arbitrary must often be used for the separation into groups of such a great variety of forms. It is a well-known fact that in all divisions of the animal kingdom we have instances of the trend of widely separated forms toward a common point, so that two birds, really not at all closely related, may have a striking superficial resemblance. These resemblances, coupled with a scant knowledge of the internal anatomy of the bird and little or nothing of its habits in life, have brought about many errors in the determination of the true status of many species. With the hope of shedding some light on the position of some Costa Rican species, I here give in detail my observations on the habits of a few of these birds.

*Rhodinocichla rosea eximia*. This species is to be found exclusively in the thick second-growth so common about Boruca and Buenos Aires, seeking the most impenetrable parts, where it spends much of



its time on or near the ground, climbing and hopping about more after the manner of the larger wrens than anything else. Apparently it is entirely insectivorous. It is almost always seen in pairs (after the breeding season), or a pair of old birds accompanied by one or two young birds of the year. They are very shy, and when approached go skulking off, hopping rapidly from limb to limb or making short flights. The most striking characteristic is the song, which is of the true wren type, having none of the qualities of the warblers and being made up of a series of exquisite trills and whistles, but always with that full, open, liquid quality so characteristic of the tropical wrens. Unfortunately nothing was observed of the breeding, the type of nest, or the number of eggs deposited, as I arrived in that region after the breeding season.

*Scytalopus argentifrons* and *Zeledonia coronata*. Almost all which is to be said of the habits of one of these birds is applicable to the other. They range from between 7,000 and 10,000 feet in the dense, moisture-soaked forests to be found at those altitudes, on a hillside or in some dark deep ravine, choked with brush and fallen trees. They are continually creeping and hopping about under the masses of half decayed branches, searching for insects and larvæ, and would be rarely seen or collected were it not for their song. The notes of the birds are quite alike in quality and in pitch, but there is a considerable difference in the manner of rendering. It is a clear, musical whistle, the tone being very close to D# in *Scytalopus* and to C# in *Zeledonia*. *Zeledonia* repeats the same note from six to eight times with the same interval between each note, while the length of the note and the interval is about the same. *Scytalopus* has quite a different method, repeating the notes in triplets, very rapidly, and with only a very short interval between each. These triplets may be repeated from three to ten times according to the mood of the bird, with an interval of perhaps one or two seconds between each triplet. The note is easy to imitate and the birds readily respond (although not every time) to skillful calling. Nothing was ever learned about the nidification of either species.

#### LOCALITIES IN COSTA RICA AT WHICH BIRDS HAVE BEEN COLLECTED.

*Achiote*; *El Achiote de Póas*: — Name given to two small brooks, which rise on the western slope of the Volcan de Póas, emptying into the Rio Póas between Grecia and the summit of the volcano. This



name appears mostly on specimens collected by Señor don Anastasio Alfaro. Probable altitude, 6,000 to 7,000 feet.

*Agua Caliente*:—A small village, situated on a river of the same name, about four miles south of Cartago, and at a considerably lower altitude (about 3,800 feet). There are very few references to the locality, mostly by early collectors. It is on the Caribbean slope.

*Aguacate* (mountains); *Monte del Aguacate*:—A spur of the main Central American or Andean range, extending westward to the valley of the Barranca River, and crossed by the "Camino Real" from San José to Puntarenas, via Alajuéla. The highest point in the range is about 4,150 feet. There are very few references to this region.

*Alajuéla*:—Capital city of the province of the same name, with about five thousand inhabitants. It is thirteen miles west of San José and the terminus of the old Ferrocarril de Costa Rica, and has an altitude of 3,100 feet. It is situated on the Rio Grande de Tárcoles, flowing into the Pacific Ocean.

*Alajuelita*:—Situated four and one-half miles southwest of San José. A very small village, called sometimes San Josesito; mentioned by Zeledón and others. Conditions about the same as at San José. Pacific slope.

*Alto del Tablazo*:—A small table-land in the Candelaria mountains southeast of San José at an altitude of 4,050 feet, opening into the valley of San José.

*Alto de Ochomogo*; *El Alto*; *Laguna de Ochomogo*:—The point on the continental divide at which the railroad and cart-road cross in going from Cartago to San José. It is a small plateau with an altitude of 5,280 feet, and contains a marshy pond of about 1,000 yards in circumference. The heights of La Carpintera, the end of the Candelaria mountain chain, rise towards the south.

*Angostura*:—A small valley situated on the south side of the Rio Reventazón, at an altitude of about 1,980 feet, and exactly opposite from Turrialba, a station on the Ferrocarril de Costa Rica. It has a very hot, humid climate and is reputed to be rather unhealthy. It was at this point that Julian Carmiol obtained so many of the birds peculiar to the Caribbean fauna. Few collectors have visited the region except Carmiol and Zeledón. It is just below the Tuís Valley, and is surrounded by forest-clad hills.

*Anonos* (Los):—A point on the road from San José to Escazú where it crosses the Rio Tiribí. The conditions are the same as at

any point in the valley of San José. Zeledón and Alfaro mention this locality. (Designated by some authors as Las Anonas.)

*Aserri*:—One of the oldest villages in Costa Rica, situated south of San José, in the same valley, about seven miles distant. Entirely surrounded by coffee-plantations and cultivated lands.

*Atenas*:—A town of about fifteen hundred inhabitants on the Ferrocarril al Pacifico at an altitude of about 2,300 feet. It is on the cart-road between Alajuela and San Mateo, and situated in the midst of cultivated lands. Rarely mentioned by collectors.

*Atirro*:—A small village situated on the banks of a stream of the same name near the point where it empties into the Rio Reventazón. It is nearly opposite, and only about four miles distant from the station of Turrialba on the railroad. Conditions much the same as at Angostura and Tuís. The locality is not often mentioned.

*Avangares* (Las Juntas de):—A village situated on the shores of the Gulf of Nicoya on the mainland opposite the Island of Chira. Mentioned only by Mr. Lankester, I believe.

*Azahar de Cartago*:—Four or five miles from Cartago to the southwest, in the Candelaria Mountains, and having an altitude of about 5,000 to 7,000 feet.

*Bagáces*:—A squalid village in Guanacaste, on the Rio de las Piedras, a branch of the Rio Bebedero, flowing into the Tempisque. It is only a little above sea-level, is very hot, and surrounded by "Sabanas," marshy lagoons, and some woodland.

*Bahia de Salinas*:—A small bay on the Pacific coast just at the entrance to the Gulf of Nicoya and about twelve miles southeast of Puntarenas.

*Balsa* (Valsa; La Valsa):—A point at the head of the San Carlos River, probably only named from the river, which forms one of the small tributaries of the San Carlos. This locality seems to have been visited only by Carmiol, there being skins in the United States National Museum as well as in the British Museum collected by him and bearing the name of this locality.

*Banana, Rio*:—A fairly large river which rises in the Chirripo Mountains and empties into the Caribbean Sea about four miles south of Port Limon. The level land along both banks has been cleared of forest and planted with bananas.

*Barba, Volcan de*:—An extinct volcano lying between the volcanoes Irazú and Póas, and having an altitude of 9,355 feet. The

southern and western slopes are cultivated or made into pastures up to 7,000 or 8,000 feet, but the eastern and northeastern slopes are a mass of virgin jungle. Underwood and Alfaro are about the only collectors who have visited the region. Mr. Underwood says his collecting was done at about 5,000 feet on the southwestern slope.

*Barranca* (Bajo de la); *Barranca de Puntarenas*:— Situated on the railway between Puntarenas and Esparta, at a point just below the crossing of the Rio Barranca. There has been a great deal of confusion as to the locality "Barranca," all authors supposing it to refer to the above-mentioned locality, while in reality most of the older records, especially those of Frantzius and Carmiol refer to another Barranca (see following locality). All of Underwood's localities refer to this one. It is not more than 200 feet above sea-level, while Frantzius distinctly refers to the "cool climate of Barranca," meaning the following locality.

*Barranca*:— On the edge of a small stream of the same name to the north of the road to San Carlos, and on the slopes of the Volcan de Póas, and with an altitude of not less than 6,000 feet, probably more. It is very probable that all of Frantzius' and Carmiol's records refer to this locality, and possibly some of Zeledón's.

*Bebedero*:— A small dirty village at the junction of the Rivers Tenorio and Las Piedras, in Guanacaste, and not much above sea-level. A great many specimens have come from this locality. Arcé collected here first, and in turn Underwood, Cherrie, Alfaro, Lankester, and the writer. It is a region of grassy savannas, marshes, and heavy forest, and a very good collecting-ground, although a rather disagreeable place to work in.

*Bellavista*:— (See Hervidéro.)

*Birris*:— Name denoting the locality in the region of a small river of the same name which flows through a very deep gorge into the Rio Reventazón between Paraiso and Juan Viñas. The railway crosses this gorge over a magnificent iron bridge over six hundred feet in length. The altitude of the region referred to as Birris by Zeledón and Cooper is about 3,000 to 3,500 feet above sea-level and on the Caribbean slope.

*Boca de Matina*:— The point at which the Matina River empties into the Caribbean Sea, about eighteen miles northwest of Port Limon.

*Bolson*:— A small village of about two hundred inhabitants in Guanacaste on one of the large tributaries of the Rio Tempisque, of

the same name as the village, and about twenty miles inland from the mouth of the Tempisque. Practically all the collecting done at this point was by Underwood in 1908. Conditions are practically the same as at Bebedéro and Bagáces.

*Bonilla* : — A station on the railway from Limon to San José and fifty-two and one-half miles from the latter point. It is close beside the Reventazón River and at an altitude of about 1,000 to 1,200 feet. The fauna is practically that of the Caribbean lowlands, although many of the foot-hill forms are taken there. Almost all of the collecting done there was carried on by Messrs. Ridgway and Zeledón in 1905 and 1908 and by Basulto in 1908. It has a very rich bird-fauna, conditions being very favorable by reason of the heavy forest having been removed over a considerable area and replaced by pastures, in which many trees have been left scattered about.

*Boruca* : — An Indian village of about three hundred to four hundred inhabitants, situated in a small bowl-shaped valley in the hills on the north side of the Rio Grande de Térraba, and having an altitude of about 1,500 feet. The surrounding country is very broken and interspersed with woodland and savanna. The first collecting done in this region was by Cherrie in 1891-2, the next by Underwood in 1906, by myself in 1907, and again by Underwood in 1908, on which trip, however, he worked only at Buenos Aires and El General, farther up the valley.

*Buenavista* : — Situated on the San Carlos River at a point about midway between the headwaters of that river and the point known as La Muelle de San Carlos. Castro and Fernandez made a trip here for the Museo Nacional de Costa Rica, during the time Mr. Cherrie was in that country (probably in 1892 or 1893), at which time the type of *Buthraupis cæruleigularis* was secured, together with other rare species.

*Buenos Aires* (de Térraba): — A thriving village of Costa Ricans and Chiriquanos situated in the valley of the Rio Grande de Térraba, on the Rio Ceibo about three miles above its junction with the Rio Grande. It has an elevation of only 1,000 feet and is quite hot. There are extensive savannas, surrounded and interspersed with woodland, and birds are abundant, especially along the Rio Ceibo. It is about twenty-five miles from Boruca. Collecting done there by Cherrie, Underwood, and myself.

*Cabagra* : — An Indian village on the lower slopes of the Volcan Pico Blanco, to the east of Térraba. Conditions much the same as at

Boruca. Mr. Cherrie collected a few specimens there. Altitude about 2,000 feet.

*Cachí* :—A small village situated on the south bank of the Rio Reventazón, at a point nearly below Paraiso. It is just below Orósi and the Rio Navarro, with an altitude of about 2,000 to 2,500 feet, but with surrounding mountains rising to a considerable altitude. There are many coffee-plantations in the vicinity. The only collectors who have worked there are Zeledón, Underwood, and Lankester. From Mr. Lankester's reports I should assume that it has a very rich bird-fauna.

*Candelaria* (La) ; *Candelaria Mts.* :—The mountain range enclosing the valley of San José on the south side, with portions rising to an elevation of not less than 7,000 feet. The Candelaria Mountains being easily accessible from San José, have been collected in by almost all collectors from the time of Frantzius, and referred to variously as La Candelaria, Candelaria Mts., etc., while the altitude from which specimens have come may be placed at anywhere from 4,000 to 7,000 feet.

*Cangrejas* :—A hamlet on the road to Pózo Azul de Pirrís, on the opposite side of the Candelaria Mountains from San José. Used by Underwood on some of his labels.

*Capelladas* :—A large village on the slopes of the Volcan de Turrialba above Juan Viñas, at an altitude of about 5,000 feet. Some of my collecting was done at this point in April and May, 1907.

*Cariblanco de Sarapiquí* :—A point on the Sarapiquí River situated in the foot-hills of the north slope of the Volcan de Póas, probably at an elevation of about 1,500 to 1,800 feet. Messrs. Lankester and Underwood are the only ones who have collected in this rich locality. The fauna is about the same as at Carrillo, containing most of the Caribbean lowland forms as well as representatives of the foot-hills fauna. It is a region of dense forests (where not cleared) and heavy rainfall.

*Carpintera* (La) :—The hills forming the northern extremity of the Candelaria ridge, lying just to the south of Tres Rios, a large village on the railway between El Alto de Ochomogo and San José. Mr. Cherrie did considerable collecting at this point.

*Cartago* :—Second largest city of Costa Rica, situated in a beautiful large valley, on the Caribbean side of the continental divide at an altitude of 4,500 feet. Surrounded by farms of coffee and cane and pasture-land. The Volcan de Irazú lies just to the north of it and the Las Cruces Mountains to the south.

*Carrillo* :—The former terminus of the first railway built on the Caribbean lowlands. Situated at the mouth of the gorge of the Rio Súcio, which rises between the Volcanoes Irazú and Turrialba, flowing northeast. Has an altitude of about 1,500 feet, is surrounded by steep forest-clad ridges, except to the northeast, where the land slopes gently away to the Caribbean Sea. Has an annual rainfall of over 200 inches. Cooper, Zeledón, Underwood, and myself have done considerable collecting at this point, which has a very rich bird-fauna, many things being taken there which are very rare or wanting in all other localities. It is reached by an old (now abandoned) cart-road from San José, via La Palma, and by a trail from Guápiles, the present terminus of the Old Line Railroad ("Linea Vieja").

*Carrillos de Alajuela* :—A large village situated on the road between Grecia and Alajuela between the Rivers Póas and Tacares. Pacific slope, altitude about 3,500 feet, with conditions about the same as the valley of San José.

*Cedral de Candelaria* :—A point in the Candelaria Mountains with the exact location of which I am not acquainted, but which is near Monte Redondo.

*Cerros de la Candelaria* :—(See Candelaria Mountains.)

*Cervantes* :—A village, situated about six miles east of Cartago on the road to Juan Viñas. It is in the broken rocky foot-hills just between the bases of the volcanoes Irazú and Turrialba, at an altitude of about 4,000 feet. Cooper and Zeledón collected a considerable number of specimens at this point.

*Ciruelas* :—A small village in Guanacaste in the vicinity of Bagaces. I believe the only references to this locality are attached to the specimens taken there by Mr. Lankester and myself.

*Coliblanco* :—I cannot find this word used for any locality in the vicinity where Mr. Ridgway collected, but from what he tells me concerning the place it must be some obscure local name for a point on the cart-road running from Cartago through Capalladas and thence through Santa Elena and up the Volcan de Turrialba to the hacienda of Senor don Francisco Gutierrez. It probably lies between Santa Elena and Santa Cruz, and is on the long ridge running down from the summit of the Volcan de Turrialba in a northeasterly direction and ending at La Junta. Messrs. Ridgway and Zeledón and Alfaro collected here in 1908, securing a magnificent lot of material representing forms both of the mountains and foot-hills.

*Concepcion de Jiménez*: — I am not quite certain of the location of this point, but I think it is situated in the foot-hills just above Jiménez on the road which the River Plate Company opened from Jiménez up the north slope of the Volcan de Turrialba some years ago, but which since has been abandoned and is now overgrown with jungle. Mr. Cherrie seems to have been the only collector who used the name on his labels.

*Concovas (Las)*: — A large marshy lagoon situated at the head of the valley in which lies Cartago, and just at the foot of the Candelaria Mountains, on their eastern side. During the winter months it is a great resort for ducks, snipe, and shore-birds generally.

*Copey (El, de Dota)*: — A small village in the Dota Mountains on the road between Santa Maria and Las Vueltas, with an altitude of about 6,000 feet. Francisco Basulto collected there in 1908, under the direction of Messrs. Ridgway and Zeledón.

*Coralillo*: — A small town in Nicoya about ten miles inland and directly west of the mouth of the Tempisque River. Underwood collected there in 1908.

*Coronado (de Térraba)*: — A small village of Chiriquanos and Costa Ricans at the mouth of the northernmost branch of the delta of the Rio Grande de Térraba, known as Boca Mala. I collected a little there in 1907, most of my specimens of *Agyrtria boucardi* coming from near there.

*Coronel*: — A point in the gorge of the Rio Sucio about four miles above Carrillo. Underwood collected there in 1905. In general the same species occur there as at Carrillo.

*Cot*: — A small village on the slopes of the Volcan de Irazú about four miles from Cartago. This place is mentioned by some of the early collectors. Probable altitude about 5,500 feet.

*Coyolar*: — A small village four or five miles below San Mateo, on the Pacific slope between the Rio Grande de Tárcos and the Rio Machuca. Señor Alfaro collected there in 1905 while in company with Mr. Ridgway. I find no other reference to the locality.

*Cuábre*: — A point on the Rio Sicsola, where the trail crosses from the Caribbean Sea at Old Harbor to the Sicsola, thence up the river to Sipurio and beyond. I collected there for about a month in 1904. It is four miles inland from the sea and not more than 100 feet above sea-level.

*Cuádro (Los, de Irazú)*: — A point on the southwest slopes of the

Volcan de Irazú at about 7,000 feet, where Underwood collected at different times.

*Cuádro* (del Mojón): — Same as preceding.

*Curridabat*: — A town of considerable size about four miles east of San José on the railway. Conditions and altitude nearly the same as at San José.

*Desamparados*: — A large village four miles south of San José, at an elevation of about 3,800 feet. It is in a thickly settled district full of small farms and coffee-plantations.

*Desangañ*: — The pass between the Volcan de Póas and the Barba range, through which the road passes to Sarapiquí. It has an altitude of about 6,500 feet, and is twenty-five miles from Alajuela.

*Desmonte*: — A village of about six hundred inhabitants on the western slope of the Aguacate Mountains, through which passes the government cart-road from Alajuela to San Mateo. It is five miles from the latter place, and has an altitude of 1,600 feet. This locality is mentioned by Frantzius on some of his labels.

*Diquis* (Rio): — See Grande de Térraba (Rio).

*Dos Novillos*: — On the Old Line Railway near the Destierro River, and beside a small river of the same name. It is eight and a half miles distant from Siquirres and has an elevation of not more than 400 feet above the Caribbean Sea. It is mentioned by Cherrie and Underwood.

*Dota* (Cerros de): — The Dota Mountains are situated south of San José, between the Candelaria Mountains and the Pacific Ocean, the highest portions being in the southern part, and known as El Cerro de la Muerte, where an elevation of about 10,500 feet is attained, and over which passes the trail from Buenos Aires and El General de Térraba to San Jose.

*Dota* (Santa Maria de): — A town in the upper valley of the Rio Parrita Grande above San Marcos, in the Dota Mountains, and about thirty-seven miles south of San José. This locality has been visited by many collectors, Frantzius, Carmiol, Zeledón, Underwood, and others. The region is heavily wooded, has a cool climate with a heavy rainfall, causing conditions very similiar to those present on the upper Caribbean slopes, with the result that many species of birds are found there, which, with this exception, are to be found only on the Caribbean slopes.

*Escasú* or *Escazú*: — A small town about five miles southwest of San José, at the foot of the mountains bounding the valley of San José



on the south. Underwood has collected a great deal in this vicinity, but most of his collecting was done up the mountain slopes above Escasú at an altitude of 4,000 to 4,500 feet. These slopes are interspersed with woodland and cultivated lands and offer a good field for the collector.

*Esparta* : — A town of about fifteen hundred inhabitants near the Pacific coast and connected with Puntarenas by a line of railway. It is situated on a plateau between the Rio Barranca and the Pacific Ocean at an altitude of about 700 feet. The climate is exceedingly hot, but very good collecting may be found along the slope descending to the Rio Barranca, which is still to a great extent forested.

*Estrella* (La, de Cartago) : — A point six to eight miles from Cartago in the Candelaria mountains, at an altitude of from 6,000 to 7,000 feet. Underwood has collected a great deal in this region, taking here many of the high mountain species, which are only taken at higher altitudes on the volcanoes. It is a region of forest and pasture-land.

*Faldas de Barba* : — Slopes of the Volcan de Barba ; does not designate any particular place.

*Faldas de Irazú* : — Slopes of the Volcan de Irazú ; does not designate any particular place.

*Faldas de Póas* : — Slopes of the Volcan de Póas ; does not designate any particular place.

*Florida* (La) : — Station and name of a plantation on the railway from Limon to San José, situated eight miles above La Junta, beside the Rio Reventazón. Mr. Lankester reports some records from this place.

*Frailes* (Los) : — A point in the Las Cruces Mountains, nineteen miles from San José, on the road to San Marcos, at an elevation of about 5,100 feet. Frantzius collected specimens at this place, while Zeledón also mentions it.

*Frio* (Rio) : — A large river rising on the northern slopes of the main continental range east of the Volcanoes Tenorio and Miravalles, and emptying into the San Juan River near Lake Nicaragua. Dr. Richmond collected on the lower river in 1892.

*General* (El, de Térraba) : — A small village in the upper part of the Térraba valley, situated on the Rio General de Térraba at an elevation of perhaps 2,000 feet. The trail from Buenos Aires to San José by way of El Cerro de la Muerte passes through the place. Under-

wood collected there in 1908. The bird-fauna is about the same as at Buenos Aires, and, with a few exceptions, the same as at Boruca.

*Grande de Tárcoles* (Rio) : — A large river rising in the Valley of San José and after receiving many branches emptying into the Gulf of Nicoya about twenty miles southeast of Puntarenas. This valley seems to form the dividing line between two classes of birds, those coming down the Pacific coast from the north and those going up from Panama.

*Grande de Pirris* (Rio) : — A large river rising partly in the southern slopes of the Candelaria Mountains, and partly in the Dota Mountains, and emptying into the Pacific Ocean about twenty-five miles southeast of the entrance to the Gulf of Nicoya.

*Grande de Terraba* (Rio) : — The large river draining the Terraba Valley is called Rio Grande from the Junction of the General and Ceibo, to the Pacific Ocean. An older name, but not used in late years, is Rio Diquís. This name still appears on some maps.

*Grecia* : — A city of considerable importance situated about twelve miles northwest of Alajuela, on the lower slopes of the Volcan de Póas, at an altitude of about 3,500 feet. It is mentioned chiefly by Alfaro and Zeledón.

*Guácimo* or *Guásimo* : — A small town on the "Linea Vieja," situated on a river of the same name. It is fourteen miles from La Junta and eight miles from Guápiles, at an elevation of about 600 feet. It lies just on the lower edge of the foot-hills of the northern slope of the Volcan de Turrialba, and has a very rich bird-fauna. Messrs. Lankester, Crawford, and myself are the only collectors who have worked at this point.

*Guadaloupe* : — A village or rather town of about two thousand inhabitants situated two miles northeast of San José, on the road to La Palma. The name is practically synonymous with San José.

*Guaitil* : — A point in the valley of a little river of that name, rising in the Candelaria Mountains and flowing into the Rio Grande de Pirris. It is just off the road from San José to Pózo Azul de Pirris and not far beyond San Ignacio. F. Carmiol was the first to collect at this point. Frantzius also worked there, while I obtained a few specimens in the vicinity while en route to Pózo Azul.

*Guanacaste* : — The name of the Province embracing the whole of the peninsula of Nicoya and the Pacific slope up to Nicaragua, but generally applied (by collectors) to the Tempisque Valley and the vicinity of the Volcan de Miravalles and Tenorio.

*Guápiles* : — The present terminus of the Old Line Railroad ("Linea Vieja"), fifty-nine miles from Port Limon and about one mile east of the Rio Toro Amarillo. It has an elevation of 800 feet above sea-level and as a rule a pleasantly cool climate, with very little malaria. There are many large pastures surrounding the place, with trees scattered through them, while back of these is the virgin forest. It is a magnificent collecting ground. Mr. Crawford and myself seem to be the only ones who have worked there.

*Guayabal* : — A small village not far from Turrialba on the Caribbean slope at an altitude of about 2,000 feet. A region of forest, coffee- and sugar-plantations. Zeledón and Underwood collected there.

*Guayábo* : — A station on the railway from Port Limon to San José, between Turrialba and Juan Viñas, at an altitude of about 2,500 feet. The conditions are very favorable for bird-life, and many species are there present. Mr. Ridgway, in company with Messrs. Zeledón and Alfaro, made extensive collections at this point in 1905. Much of the collecting was very probably done in the hills back of the station at a much higher altitude, probably up to 4,000 feet.

*Heredia* : — A city of considerable importance situated on the railway between San José and Alajuela on the Pacific slope at an altitude a little lower than that of San José. Climatic conditions about the same. The name does not often appear on the labels of birds.

*Hervidero* : — Probably only another name for Agua Caliente.

*Hogar* (El) : — Name of a large plantation of bananas three miles from Guácimo, on the "Linea Vieja," and formerly a station on the railway. It occupies a position midway between Jiménez and Guácimo, with the same conditions. Has a very rich and varied bird-fauna. With the exception of Mr. Lankester, I do not know of any other collector beside myself who has worked there.

*Hondura* (La) : — A point at which is situated a small farm on a little shelf or plateau in the upper gorge of the Rio Blanco, the largest tributary of the Rio Súcio, through which passes the old cart-road from San José to Carrillo. It has an altitude of about 4,000 feet, is usually cold and rainy, and is surrounded on all sides by mountains covered with jungle. Many of the species peculiar to the higher altitudes are found there. Both Underwood and myself have done considerable collecting at this point. It is on the Caribbean slope.

*Irazú* (Volcán de) : — The highest of the mountain peaks of Costa Rica, an extinct volcano lying between the volcanoes Turrialba (on the east) and Barba (on the west), with an elevation between 11,300 and 11,900 feet (the exact altitude is uncertain).

It is a very large, flat-topped peak, sloping away gradually in all directions, except to the north, where it is very precipitous. The crater is immense, being at least half a mile in diameter, with several deep openings in the floor, one of which extends to unknown depths. It is entirely extinct and grass and stunted shrubbery grows over the whole summit as well as inside the crater, wherever foothold can be secured in the lava and ash composing the cone. The simple term *Irazú*, when used by a collector means very little when we attempt to exactly locate the place from which the specimen came, as it may be anywhere between 5,000 and 10,000 feet above sea-level, on the Pacific or Caribbean slope. However, most collectors have visited the southern and western slopes of the volcano, and it is safe to assume that most skins marked "*Irazú*" came from somewhere between 8,000 and 10,000 feet on that slope. The specimens which I collected there were taken between those altitudes, unless otherwise designated.

*Isla de Uva* : — An island in the harbor of Port Limon, containing a light-house and quarantine-station. A colony of Gannets make their home there.

*Jiménez* : — A small town on the Old Line Railway, fifty-five miles from Port Limon, and situated just at the edge of the foot-hills of the Volcan de Turrialba. Towards the north much of the forest has been cleared away for the planting of bananas for three or four miles back from the railroad, but to the south or towards the volcano it is a solid mass of virgin jungle, very rich in bird-life. Some of the rarest of the Costa Rican birds have been taken here and some of them only here. Señores Alfaro and Carranza ; Messrs. Underwood, Cherrie, Verrill, and myself have collected at this place.

*Juan Viñas* : — A thriving village situated on the plateau above the railroad from Limon to San José, and twenty-eight miles from the latter city. It lies on the eastern slope of the Volcan de Turrialba, at an altitude of about 3,000 feet, with almost a sheer drop of a thousand feet down into the gorge of the Rio Reventazón, on the other side of which and a little lower down is the Indian village of Tucuríqui, where Arcé collected the types of so many rare species. It was

formerly known as Naranjo de Cartago, and wherever that name is encountered in ornithological literature it refers to Juan Viñas. In this paper I have used the name of Juan Viñas instead of Naranjo in all of Boucard's records (P. Z. S., 1878). Zeledón, Cooper, Underwood, Boucard, and myself have collected at this point.

*Junta* (La): — The little town on the railroad, thirty-eight miles from Port Limon, where the new portion of the line branches off up the Reventazón River to San José, while the old portion continues up the Santa Clara Valley to Guápiles. This locality is mentioned by Underwood and Carranza.

*Juntas* (Las, de Térraba): — The point on the Rio Grande de Térraba where the river begins to split up into the various branches of its delta.

*Lagarto* (de Térraba): — The point on the Rio Grande de Térraba where navigation by canoe ends, and the trail up the mountain to Boruca begins. At this point is a stretch of low level land along the river where the Indians plant their bananas, plantains, and cassava; the soil in and about the village being too hard and poor to raise those plants successfully. This place is mentioned by Messrs. Cherrie and Underwood. I did no collecting there myself.

*Laguna de Cartago*: — (See Alto de Ochomogo.)

*Laguna de Ochomogo*: — (See Alto de Ochomogo.)

*Laguna de Coris*: — (See Concovas, Las.)

*Lagunaria de Dota*: — A point high up in the Dota Mountains visited by Basulto in 1908. It is south of Santa Maria and El Copey, and probably nearly 10,000 feet above the sea.

*Lepanto*: — The name of a point, a bay, and an old, now almost abandoned, village on the Gulf of Nicoya, on the side of the Nicoya Peninsula. The only mention we have of this locality is by Ellendorf, who collected a few skins there in 1858 or 1859.

*Limon* (Puerta or Port): — The Caribbean seaport of Costa Rica, from which the railroad starts for the interior. Very little collecting has been done in the immediate vicinity.

*Macho* (Rio): — A small river rising on the southwestern slopes of the Volcan de Irazú and flowing to the north of San José into the Rio Virilla. Mentioned by Frantzius.

*Machuca* (Rio): — A small stream, from which the name of the locality was taken by Frantzius. It rises just above San Mateo and flows into the Pacific Ocean or rather the Gulf of Nicoya near Tivives.

*Maria Aguilar* (Rio) : — A small stream in the valley of San José and quite near that city. Referred to by several old collectors.

*Matina* : — Name of a town on the railway where it crosses the river of the same name, twenty-two miles from Port Limon, in the lowlands of the Caribbean.

*Mesas* (Las) : — The name of a large coffee-plantation situated on the plateau above the Rio Reventazón, between Juan Viñas and Paraiso, at an altitude of about 3,500 feet. It is just below the Birris River and the famous Birris Bridge. I did not find the name used by any other collectors beside myself.

*Miravalles* (Volcan de ; also name of a "hacienda" on the volcano) : — This is a low volcanic mountain in Guanacaste, from the slopes of which rise the northern branches of the Rio Tempisque. The term Miravalles as applied by collectors usually refers to the large cattle-ranch on the slopes of the volcano, rather than to the mountain itself. Messrs. Underwood, Lankester, and myself have made extensive collections there. The altitude of the "hacienda" is about 1,500 to 2,000 feet, and the country consists of partly natural and partly artificial pastures with clumps of trees scattered through them, while in some places are extensive tracts of forest. The fauna here is entirely of the Pacific.

*Mojón* (San Pedro del) : — A beautiful village about two miles east of San José on the railway, also connected with San José by electric cars. The outskirts of this village are a favorite collecting ground for Mr. Underwood, and many of his skins bear the name. It is variously known as San Pedro de San José and San Pedro del Mojón. Frantzius also refers to it as "El Mojón."

*Mojica* : — A small village midway between Bebedéro and Bagáces in Guanacaste. Mentioned by Mr. Lankester and myself, also by Underwood, I believe.

*Monte Aguacate* : — (See Aguacate.)

*Monte Redondo* : — A point in the Candelaria Mountains, situated over the crest, south of San José, in a valley at an altitude of about 4,000 feet. Many of Underwood's labels bearing the locality name of Candelaria, refer to this point.

*Moravia* : — A name which has been very seldom used by collectors. Frantzius first collected there and designated the place as between the Pacuare and Chirripo Rivers, which would make it on the Caribbean watershed at an altitude of about 2,000 to 3,000 feet and

probably reached through the Tuís Valley, by way of Turrialba and Angostura, and about fifteen miles southeast of the Reventazón River. There is a tributary of the Pacuare River, designated on some maps as Rio Moravia, which is very likely the place in question.

*Naránjo* :— This place must not be confused with Naránjo de Cartago (Juan Viñas), for it is in quite a different locality, being on the Pacific slope of the plateau region nearly midway between Grecia and San Ramon, and about eighteen miles northwest of Alajuela, and at an elevation of about 3,000 to 4,000 feet.

*Naránjo (Rio)* :— A large river to the south of the Rio Grande de Pirris, about midway between that stream and the mouth of the Rio Grande de Térraba. It rises in the rain-soaked heights of the Cerro de la Muerte. Mr. Cherrie is the only collector who has been in this region, and any birds bearing that locality or Pózo del Pital may safely be accredited to him.

*Navarro* :— A small river and village, the former rising in the Las Cruces Mountains, and flowing northeast into the Agua Caliente, thence into the Reventazón. The name appears on skins of both Boucard and Cooper. It is on the Caribbean slope at an altitude of probably 2,500 to 3,000 feet.

*Nicoya* :— Name applied to the large gulf on the western coast of Costa Rica, as well as to the peninsula opposite it. The term Nicoya on a label is very indefinite, although probably most skins so labelled came from the valley of the Tempisque River, at some point.

*Ochomogo* :— (See Alto de Ochomogo.)

*Old Harbor* :— On the Caribbean coast, about twenty-eight miles southeast of Port Limon. It has a small port inside a coral-reef, but only suitable for very small craft. It is the point of entry for the whole of the Talamanca region. Prof. Gabb collected there.

*Orósi* :— On the Reventazón River, very near to Cachí and Navárrro. Reached from Paraiso or from Agua Caliente. Boucard, Cooper, and Underwood collected there, possibly Zeledón and Carmiol also.

*Pacaca* :— About sixteen miles southwest of San José, on the road passing through Escazú. It is at the foot of the Cerros del Puriscal, and at an altitude of approximately 2,000 feet.

*Pacuare* :— A large river rising in the Chirripo Mountains and flowing northeast, nearly parallel to the Reventazón, to the Caribbean Sea. It is uncertain to just what point on its course the name, as used by collectors, refers; but it must be some place almost as far down as the

railway crossing, because all the species labelled "Pacuare" are distinctly of the Caribbean lowland fauna, and probably not found above 1,000 or 1,200 feet. Carmiol used the name often, also Zeledón, and at that time the river must have been reached by way of the Tuís Valley, through which passes an old Indian trail going in that direction.

*Pacuarito* : — Name of a small tributary of the Rio Pacuare, and of a station on the railway at the point where it crosses the stream. It is between Matina and Siquirres, nearer the latter point, and collected at only by Mr. Cherrie.

*Pais* or *Paez* : — A small river crossing the railway between Cartago and Paraiso, rising on the lower slopes of the Volcan de Irazú and emptying into the Rio Agua Caliente. It seldom appears on bird-labels, and was used only by the early collectors, probably only by Frantzius.

*Palma* (La, de Nicoya) : — A small hamlet in the Canton de Nicoya, between the Gulf of Nicoya and the city of the same name, at which Mr. Nutting made a considerable collection of birds in 1881 for the United States National Museum. It must not be confused with La Palma de San José.

*Palma* (La, de San José) : — Name of a "hacienda" on the road between San José and Carrillo, just over the western side of the crest of the continental divide, and at an elevation of about 6,500 feet. This locality is mentioned by Zeledón and Underwood. It lies at the depression between the Volcanoes Irazú and Barba.

*Palmar* : — A small Indian settlement on the Rio Grande de Térraba, on the trail between El Pózo and Boruca. It lies just at the foot of the abrupt mountain over which the trail crosses to Boruca. It is only about fifty feet above sea-level, and was visited by Mr. Cherrie in 1891. Neither Mr. Underwood nor myself worked there.

*Palo Verde* : — A small hamlet on the Tempisque River, near Humo, Guanacaste. It is near sea-level with conditions similar to Bebedéro and Bagáces. Mr. Lankester collected a few skins there.

*Pascua* : — A stopping place on the railway beside the Reventazón River, just below Bonilla, between that point and Las Lomas. The place has been made famous by the terrific landslides which occur periodically at that point.

"*Parita*" : — A misspelling of the word Pacuare (?).

*Paso Real* (de Térraba) : — A small settlement on the Rio Grande de Térraba, northeast of Boruca and south of Térraba, where the trail



down into Chiriquí crosses the Rio Grande. The surrounding country is mostly rolling ridges bare of trees, with woodland in the valley along the river-banks and along the deepest of the creek-beds. Mr. Underwood and myself collected a few specimens there, but birds are not abundant.

“*Payua*” :— Misspelling of the word Pacuare, as used by Lawrence, and copied by others.

*Peje* (Rio): A small stream flowing into the Reventazón River from the west, a short distance below La Junta. Carmiol mentions this locality, and, since the birds taken at that place are of the Caribbean lowland fauna, it must be the locality in question.

*Pigres*:— A small village at the mouth of the Rio Grande de Tárcoles, on the Gulf of Nicoya, at which Messrs. Ridgway and Zeledón collected in 1905 and 1908.

*Pirris*:— [See Pózo Azúl (de Pirris).]

*Póas* (Volcan de):— The westernmost of the chain of volcanoes in the central portion of Costa Rica, having a lake in the crater, through which eruptions are made sporadically, much after the manner of a geyser. The altitude of the summit is about 8,700 feet. The crater has the appearance of a vast walled coliseum, the sides of which rise perpendicularly to a height of nearly 1,000 feet, and at the bottom of which lies the lake. The volcano lies almost directly north of Alajuela, distant sixteen miles, the road passing through San Pedro de Póas, from which place the start is made in ascending the volcano. The altitude of San Pedro is about 3,700 feet.

*Potrero Cerrado*:— The name of a locality or perhaps “*hacienda*” on the southwest slope of the Volcan de Irazú. I am not able to locate it exactly or to give the altitude. It is not often referred to by collectors, and mostly by the older ones, such as Frantzius and Boucard. There is a Potrero Cerrado in the Térraba Valley, but the name as used in ornithological literature never refers to it.

*Pózo Azúl* (de Pirris; sometimes referred to as Pirris):— The name given to a locality at which there is little but a wilderness of virgin forest, on the Rio Grande de Pirris. It is only about ten miles from the Pacific Ocean and at a low altitude. With the exception of a few small clearings, the whole region is a virgin forest, and has a very rich bird-fauna. It is reached by a cart-road from San José, which goes as far as Sabanilla, on the crest of the coast range, and thence by a narrow trail. Señor Zeledón and Mr. Underwood have made many col-

lecting trips to this point, while I spent over two months there in 1902 with Mr. Underwood.

*Pózo Pital*: — A point on the Rio Naránjo (between the Rio Grande de Térraba and the Rio Grande de Pirrís), with the exact location of which I am not acquainted, but from the species of birds taken there I should judge that it is at about the same altitude and has the same conditions surrounding it as Pózo Azul de Pirrís. Only Mr. Cherrie has collected there.

*Pózo* (El, de Térraba): — At the head of tide-water on the Rio Grande de Térraba, and about twelve miles from the ocean (following the course of the river). The whole surrounding country is a perfect wilderness of forest, birds and game being abundant. Mr. Underwood and myself made large collections at the place.

*Puente de Tierra*: — One of three hamlets making up the village of Sabanilla del Mojón, three miles northeast of San Pedro del Mojón. Name used by Underwood.

*Puntarenas*: — The Pacific seaport of Costa Rica, situated on a long point of sand running out into the Gulf of Nicoya, from which it takes its name. Very little collecting has been done in the place itself, and this only in the forest and mangrove-growths of the adjacent mainland.

It was here that Salvin and Dow took the type of *Vireo pallens*, and Boucard that of *Agyrtria boucardi*.

*Puriscal*: — The word Puriscal is very likely used as an abbreviation of Santiago de Puriscal, for Puriscal is the name of the canton, and not of the town. It is situated twenty-eight miles southwest of San José, at an altitude of 4,000 feet and has a population of about fifteen hundred. It lies at the foot of the range of low mountains known as Los Cerros de Puriscal.

*Quebrada Honda*: — Name of the locality through which passes a small stream of the same name, emptying into the Reventazón about two miles above Juan Viñas and just below Las Mesas. The stream rises on the lower slopes of the Volcan de Turrialba, the cart-road from Juan Viñas to Cartago crossing it at an altitude of about 4,000 feet. This locality is referred to by Frantzius.

*Reventazón*: — Name of one of the largest rivers of Costa Rica, up the valley of which the railway runs from La Junta to Cartago, only leaving the side of the gorge at a point between Las Mesas and Paraiso and running thence over the table-land to Cartago. The name as

used on bird-labels probably refers to La Junta, or some point near by, for there is no village or station by this name, only a small banana-plantation near Cairo, three miles west of La Junta. It is referred to by Carranza and Underwood.

*Retes* : — This is some obscure local name for a point near Cartago. Cooper collected a few specimens there, but it is not mentioned by other collectors.

*Rey* (El, de Dota) : — A village high up in the southern part of the Dota Mountains, at an altitude of probably about 8,000 feet. Basulto collected some skins there in 1908.

*Roble* (El) : — Four miles west of San José, on or near the Ferrocarril al Pacifico, and not far from Turrúcares. The surrounding country is level and marshy in places. I believe Underwood used the name for some point on the slopes of the Volcan de Irazú.

*Sabanilla* : — On the crest of the Pacific coast-range, and terminus of the cart-road from San José, en route to Pózo Azul de Pirris.

*Salitrillo* (El) : — There are two places of this name, one near Santa Ana de Escazú, the other near Desamparado. Conditions about the same at both. Mentioned by Underwood.

*San Antonio* (de Desamparados) : — There are many places of the name of San Antonio, but the one probably referred to by Frantzius is the present, situated one mile east of Desamparados in the valley of San José.

*San Carlos* : — This is the name of one of the largest rivers of Costa Rica, rising on the northern slopes of the main continental range, in the west central portion of the country and flowing northeastward into the Rio San Juan at a point about midway between Lake Nicaragua and the Caribbean Sea. The name as used by collectors (Boucard and others) refers to the Commandancia de San Carlos, or the Government Station on that river at the point where the Rio Arenal enters from the west. It is a pleasant journey on horseback from San Ramon, during the dry season, but almost impossible during the wet months.

*San Francisco* : — Rogers used this name on some of his labels, but I cannot be certain which of the many points named San Francisco he meant, it probably being a local name for some point near Cartago or possibly San Francisco de Heredia, about two miles from that city on the railway.

*San Isidro* (de San José) : — There are quite a number of villages named San Isidro, all scattered about over the Plateau district, but the

one in question is probably San Isidro de San José, situated seven miles northeast of San José on the slopes of Irazú at an altitude of about 5,200 feet.

*San Joaquín* (de Dota) : — A name used by Basulto for some point in the Dota Mountains and probably not far from Santa Maria.

*San José* : — The capital and largest city of Costa Rica, situated about eight miles to the west of the crest of the continental divide, known as El Alto, and lying in the centre of a large and beautiful valley or table-land, surrounded on all sides except to the west, with high mountains. It has an altitude of about 3,500 feet, a splendid climate, beautiful parks, and very well kept streets, with a population of about twenty-five thousand souls. The capital of Costa Rica, prior to 1823, was at Cartago, at which time it was moved to San José on account of the continual earthquake disturbances at the former place.

*San Juan* (de Irazú) : — Some point at a considerable altitude on the southern slope of the Volcan de Irazú, at which Mr. Ridgway collected.

*San Lucas* : — An island in the Gulf of Nicoya, on which is situated the penitentiary or penal colony of the country. Cherrie and Alfaro have collected there, and it is the locality always referred to by ornithological writers up to the present time.

*San Lucas* (de Dota) : — A locality in the Dota Mountains at which Basulto collected in 1908 for the United States National Museum, and not used by any other collector.

*San Marcos de Dota* or *Tarrazú* : — Composed of three small villages known as San Pedro, San Lorenzo, and Guadeloupe, comprising about seven hundred inhabitants. It is situated on the Rio Parrita Grande, rising in the Dota Mountains and emptying into the Rio Grande de Pirris at Pózo Azul. Altitude about 4,200 feet. It is reached by a cart-road from San José, and is passed through on the way to Santa Maria de Dota.

*San Mateo* : — A town of some importance and about one thousand inhabitants, situated at the foot of the Aguacate Mountains, at the present terminus (actual terminus in Santa Domingo about two miles distant) of the Ferrocarril al Pacifico. It has an altitude of about 1,000 feet, but has a most insupportably hot climate. It is on the main cart-road from Alajuela to Esparta. It is mentioned by Cooper, Boucard, and others.

*San Pedro* (del Mojón) : — (See Mojón.)

*San Vicente* : — I am unable to locate this point, but it is probably some small hamlet in the region lying between San José and Alajuela on the central plateau.

*Santa Ana* (de Escazú) : — There are two other villages of the same name, in widely different parts of the country, but the present one is doubtless referred to by Frantzius and Zeledón. It lies at the foot of the Candelaria Mountains, five miles from San José in a southwesterly direction and is a beautiful spot.

*Santa Clara* : — This name was used only by Frantzius, and at that time could not refer to the Santa Clara Valley of the Caribbean lowlands, so must refer to either a small stream near Zarcero, flowing into the Balsa, or to a hamlet near Esparta, but most probably the former, as both Carmiol and Frantzius collected along the Rio Balsa.

*Santa Rosa* : — A small village near Santo Domingo de Heredia, traversed by the railway from San José to Alajuela, and with conditions the same as those of Heredia. The name is used by Carmiol, so cannot refer to Santa Rosa of the Caribbean lowlands.

*Santa Maria de Dota* : — (See Dota.)

*Santa Domingo* (de San Mateo) : — I think all references to this name refer to Santo Domingo de San Mateo and not to Santo Domingo de Heredia, which is near San José. It is about two miles from San Mateo, is the present terminus of the Ferrocarril al Pacifico, and has an altitude of about 1,000 feet with a very hot climate. It overlooks the valley of the Rio Grande de Tárcoles, and is surrounded by cultivated lands producing coffee, rice, corn, beans, etc. Many collectors have worked in the vicinity.

*Sarapiquí* : — Name of one of the largest rivers in the country, rising on the northern slopes of Póas and Barba and emptying into the San Juan. The name as used by collectors refers to the region of Cariblanco de Sarapiquí.

*Sarchí* : — Referred to as Sarchí de Grecia and Sarchí de Alajuela, both meaning the same place. It lies between Grecia and Naránjo, with conditions similar to both of those places.

*Sibahue* : — This name has been used by Mr. Underwood, but it is not on the list of localities which he furnished me and I can find no reference to it.

*Sicsola* or *Sixola* : — A large river in the southeastern part of Costa Rica, draining the whole of the Talamanca region. I have used the term "Rio Sicsola" for a point at which I collected on the river

about midway between Cuábre and its mouth, where it is very little above sea-level, but with high hills just to the south, in which some of the specimens were taken.

*Sipurio* :— The Government headquarters in the Talamanca district, situated on the Rio Uren, a tributary of the Sicsola, and reached by canoe or trail from Cuábre, or by a trail going in from the Rio Estrella or North River below Banana River. Prof. Gabb did most of his collecting in Talamanca at this point. It is in a flat, forest-covered plain of considerable extent, and not more than 800 to 1,000 feet above the sea.

*Siquirres* :— A town of some importance on the railway from Limon to San José, at which point change of cars is made for the Old Line division. It is one mile east of the Rio Reventazón and on a small stream of the same name as the town.

*Súcio* (Rio) :— A large river rising at the northern foot of the Volcan de Irazú and emptying into the Rio Sarapiquí. At the mouth of the gorge of this river, at the point where it breaks out of the foothills into the plain, is situated Carrillo. The name appears on some of Cooper's labels.

*Tablazo* (El) :— (See Alto del Tablazo.)

*Tabacales* (Los) :— A name used by Frantzius and Zeledón, which I cannot locate, and to which I find no other reference.

*Talamanca* :— Name applied to the whole southeastern portion of Costa Rica, from the Caribbean to the crest of the main Cordillera, but as used by ornithologists it applies probably only to the region around Sipurio.

*Tambor* :— A small stream on the slopes of the Volcan Barba, rising near Vara Blanca and flowing southwestward into the Rio Itiquis, thence into the Rio Grande de Tárcoles. Underwood and Alfaro use the name on some of their labels.

*Tarrazú* :— The name of a canton of the province of San José, lying in the Dota Mountains. The name as used on labels probably refers to the part known as Bajos de Tarrazú, near San Marcos, and at an altitude of about 4,000 feet.

*Tempate* :— A village in the Peninsula of Nicoya, lying between Nicoya and Santa Cruz. The altitude is low and the climate hot. Arcé collected there in the sixties.

*Térraba* :— A small, and rapidly disappearing Indian village in the Térraba Valley, situated on the plateau above the Rio Grande, about

five miles from Boruca in a northeasterly direction. There is a very old Catholic mission church there with a resident missionary priest. Conditions are the same as at Boruca, although birds seem much scarcer. Mr. Cherrie collected there in 1891-2, but neither Mr. Underwood nor I stopped at the place, the people being so poor and few in numbers that it is impossible to procure food from them. The name also applies to the whole region, also called Las Llanuras de Térraba.

*Tierra Blanca*: — A beautiful and very picturesque village on the southern slope of the Volcan de Irazú, at an altitude of about 6,500 feet, through which passes the road, which leads from Cartago to the summit of the volcano, and to the large dairy-farm of Señor don Ricardo Jiménez. It is about five or six miles from Cartago.

*Tiribi* (Rio): — A small river rising on the western side of El Alto de Ochomogo, near Tres Rios, and flowing westward past San José, emptying into the Rio Virilla. This name is used by Frantzius, but by no other collectors, so far as I have noticed.

*Tobosí* (San Juan de): — A small village situated four miles southwest of Cartago, at the same altitude (a little higher), and on the eastern side of the continental divide. There are a few skins in the Carnegie Museum collected by Francisco Ulloa Cooper, with the name of this locality attached.

*Tres Rios*: — A small town between San José and El Alto de Ochomogo, nearer the latter place, through which the railway and the main cart-road from San José to Cartago pass.

*Trojas* (Las): — I am not able to exactly locate this place as its name is used by Zeledón. It is on the Pacific coast, probably at some point on the eastern side of the Gulf of Nicoya, and not far from Puntarenas, for I have seen it referred to as Las Trojas de Puntarenas.

*Tucurríquí*: — This place was made quite famous from an ornithological standpoint by Arcé, who took many rare things there, getting the types of twelve species on a single trip, among which are *Myrmeciza læmosticta*, *Hylopezus dives*, *Piprites griseiceps*, *Carpodectes nitidus*, *Lanio leucothorax*, *Aphantotriccus capitalis*, and others. It was at that time only an Indian village, situated in a little valley on the southern side of the Reventazón, nearly opposite to the present town of Juan Viñas, and exactly opposite the railway station of Tucurríquí. It has an altitude of about 2,500 feet, but is surrounded on three sides by mountains rising to a height of not less than 4,000 feet. Zeledón also collected there, and some others.

*Tuís* : — Name of a valley and a village in the same, situated opposite the town of Turrialba on the railway, eight miles below Juan Viñas. The Tuís Valley is much like that of Tucurríqui, except that it is about 5,000 feet lower, and is larger. The name does not often appear on labels. Mr. Lankester secured quite a number of specimens there in 1907.

*Turrialba* : — A thriving little town on the railway from Port Limón to San José, situated on the northern side of the Reventazón River, in the lower part of a large valley of the same name, and at an altitude of about 2,000 feet. There is a large sugar-estate there, while higher up in the valley considerable stock is raised, as well as corn and beans. Carmiol and Zeledón collected there, and also Arcé. There is little to tempt the collector at that point now, most of the forest having been cleared away for some distance about the town.

*Turrialba* (Volcan de) : — A beautiful, cone-shaped volcano of comparatively recent origin, lying to the east of the Volcan de Irazú, and forming the eastern end of the chain of volcanoes lying in central Costa Rica. The highest point of the crater reaches an elevation of 11,100 feet. From timber-line (about 9,000 feet) to the summit the rise is very abrupt, that portion above the line of trees having the shape of an almost perfect truncated cone, with two sharp ridges running off in nearly opposite directions. The crater is not more than four hundred yards in diameter, but the walls are perpendicular at almost all points, of solid rock, and averaging about 2,000 feet in height. In the western side of the crater is a pocket of recent formation which erupted fine ash and vapors up to twenty-five years ago, and still has a number of vents through which scalding hot steam still rushes, while the soft white ash forming the floor is nearly hot enough to burn the feet. There is a large stock- and dairy-farm on the plateau between this peak and Irazú (lying just west of it), belonging to Señor don Francisco Gutierrez, at whose house I was most hospitably received at the times I visited the volcano. The bird-fauna is practically the same as that of Irazú, although some species appear to be missing from each which are found on the other. The only collectors who have visited the volcano are Señor Zeledón, Mr. Ridgway, Mr. Lankester, and myself, all within the last three years.

*Turrúcares* : — A small town near the Ferrocarril al Pacífico, about ten miles from San José.

*Ujarrás* or *Ujarás* (de Térraba) : — There are several localities of



this name in Costa Rica, but the only one at which birds have been collected is the present one. It is really the name of a small valley or three small valleys at the head of the Rio Ceibo, on which is situated Buenos Aires de Térraba. The locality called Ujarás on my labels (no other collectors have used it) is the crest of the mountain above these valleys at an altitude of from 7,000 to 8,000 feet. It is a region of broken, precipitous mountains, ending in sharp ridges, the whole densely covered with a moss-covered, rain-soaked jungle, almost impossible to penetrate, but containing many rare species of birds.

*Uvita* : — (See Isla de Uva.)

*Valsa* : — (See Balsa.)

*Vara Blanca* : — A point (hacienda) on the road to Cariblanco de Sarapiquí, near El Desengaño, and at an altitude of about 5,300 feet. Mr. Lankester reports some species from that point.

*Vijagua* (La) : — A point at which Mr. Underwood made a considerable collection of birds in 1908. It is on the northern slope of the Volcan de Miravalles, at an altitude of about 1,200 to 1,500 feet, on the headwaters of the Rio Zapote. The fauna is entirely that of the Caribbean lowlands and foothills.

*Volcan de Cartago* : — (See Irazú.)

*Volcan de Irazú* : — (See Irazú.)

*Volcan de Póas* : — (See Póas.)

*Volcan de Turrialba* : — (See Turrialba.)

*Vueltas* (Las, de Dota) — A point in the southern part of the Dota Mountains at which Basulto collected in 1908 at an altitude of about 8,000 to 9,000 feet.

*Zarcero* (de Alajuela) : — Situated fourteen miles north of Naránjo, at the headwaters of the San Carlos River at an altitude of 6,600 feet. The surrounding country is very broken and water is scarce. The locality is mentioned chiefly by Zeledón.

#### HISTORY OF THE ORNITHOLOGY OF COSTA RICA.

Up to the year 1860 nothing was definitely known of the ornithology of the region known as Costa Rica, and in truth but little was known of Central America as a whole. Something of southern Mexico had been learned through the researches of Messrs. Sallé, Botteri, and Boucard, while Prince Charles Lucien Bonaparte had published a small list of birds (39 species) from Guatemala, some of which were new. Delattre had done some work in Nicaragua in 1853, the results

of which were published by Bonaparte, while to the south of Costa Rica, Mr. Bridges, M. Warscewicz, and a surveying party under Capt. Kellett had made some collections in Veragua, the results of which appeared in *P. Z. S.*, 1850, p. 162, and 1856, p. 138. In 1859 Messrs. Sclater and Salvin published a list of the birds of Guatemala, chiefly from work done by Salvin in that country from December, 1857, to June, 1858. Geo. Cavendish Taylor collected in Honduras during the winter of 1857-8, and published in the *Ibis* for January, 1860, a list of the birds taken.

The pioneers of Costa Rican ornithology are undoubtedly Drs. A. von Frantzius, Hoffmann, and Ellendorf, three Germans, who probably began collecting there in 1858 or 1859. Their collections went to the Berlin Museum (where they still are) and were identified and the results published by Dr. Jean Cabanis in the *Journal für Ornithologie* for the years 1860, 1861, and 1869. In this paper 150 species were listed, 23 of which proved new to science, but of which four subsequently became synonyms. Unfortunately Dr. Hoffmann died in Costa Rica, and Ellendorf returned to Germany, but Frantzius remained, or returned later, continuing his collecting for some time, being in San José as late as 1868 at least. Many of his later specimens were received at the Smithsonian Institution, but unfortunately the data attached to them, as well as to all of his material, are very meagre and often misleading, for many specimens are labelled "San José," which were undoubtedly not collected there.

Early in 1864 three more energetic and more competent collectors entered the Costa Rican field, namely Julian and F. Carmiol (father and son) and Enrique Arcé, a native of Guatemala and a collector for Messrs. Sclater and Salvin. The collections of the Carmiols went to Washington (Smithsonian Institution), and that of Arcé to England. Just what species Arcé collected is not known, for no complete list of his collection was ever published, merely the new species being described by Mr. Salvin in the *Proc. Zool. Soc.*, Lond., for 1864, p. 579, which numbered seventeen, as follows: *Catharus gracilirostris*; *Thryothorus atrogularis*; *Thryothorus thoracicus*; *Myiadestes melanops*; *Lanio leucothorax*; *Chlorospingus pileatus*; *Embernagra superciliosa*; *Grallaria dives*; *Myiobius capitalis*; *Piprites griseiceps*; *Carpodectes nitidus*; *Oreopyra hemileuca*; *Oreopyra calolæma*; *Chalybura melanorrhœa*; *Selasphorus flammula*; *Odontophorus melanotis*. Arcé's collection was made at several points, a small lot of material being taken

on the Gulf of Nicoya (probably at Tempate and Bebedéro), after which he crossed over to the Caribbean slope, collecting at Tucurríqui and on the Volcano de Irazú. Most of the new species came from Tucurríqui. In the article describing these new species Mr. Salvin says: "I am now acquainted with about 304 species (mostly *Passeres*) from this country, no less than 65 per cent. of which have been described by various authors as new, and which have not as yet been found beyond the limits of Costa Rica or the immediate adjoining province of Veragua."

During 1863-4 Capt. J. M. Dow (captain of one of the Pacific Mail boats) collected a few birds at Puntarenas while the steamer was there at different times, and some of these skins found their way to the Smithsonian Institution, while most of them went to Mr. Salvin. It was from these specimens (as well as others from Realejo, Nicaragua) that *Vireo pallens* and *Elainea (Sublegatus) arenarum* were described by Salvin (P. Z. S., 1863, p. 186).

We are indebted to P. L. Sclater for two additional species in 1865, viz.: *Leucopternis princeps* (P. Z. S., p. 429) and *Calliste (Tangara) dowii* (*Ibis*, Vol. VI, 371).

Previous to 1868 (date uncertain) Prof. S. F. Baird described several species in his Review of American Birds, of which we have as valid species the following: *Setophaga (Myioborus) aurantiaca*, *S. (M.) torquata*, *Basileuterus melanogenys*, and *Vireo carmioli*.

Between 1865-8 there appeared in the Proc. Acad. Nat. Sci. of Philadelphia, several short papers by John Cassin, relating more or less to Costa Rican birds. In 1865, p. 91, was described *Chrysomitris bryanti* (*Spinus xanthogaster bryanti*); page 169, a paper entitled, "On Some Conirostral Birds from Costa Rica," contained twenty-three species, of which three were new, *Arremon rufodorsalis* (*Arremon aurantirostris rufodorsalis*), *Buarremon (Lysurus) crassirostris*, and *Euphonia anneæ*; in 1867, p. 51, *Icterus salvini* (*I. mesomelas salvini*) appeared.

In 1864 Mr. George Newbold Lawrence began writing on Costa Rican ornithology from material in the Smithsonian, collected by the Carmiofs, Frantzius, José Zeledón, Juan Cooper, Manuel L. Calleja, and A. R. Endres. His list of 1868 contains all the above names as collectors of material used, and between 1864 and 1868 (when his list appeared) eight papers had been written describing new species of birds from Costa Rica as follows: *Tachyphonus (Pselliophorus)*

*tibialis*, Ann. Lyc. N. Y., 1864, p. 41; *Panychlora* (*Microchera*) *parvirostris*, Proc. Acad. Nat. Sci. of Phila., 1865, p. 37; *Philydor* (*Rhopoctites*) *rufobrunneus*, *Anabazenops lineatus* (*Xenicopsis subalaris lineatus*), *Margarornis rubiginosa*, *Dysithamnus striaticeps*, *Empidonax flavescens*, *Contopus* (*Myiochanes*) *lugubris*, Ann. Lyc. N. Y., 1865, p. 126; *Elainia frantzii*, *Mitrephorus* (*Mitrephanes*) *aurantiiventris*, Ann. Lyc. N. Y., 1865, p. 170; *Automolus rufescens* (*Philydor panerythrus rufescens*), *Grallaricula costaricensis* (*G. flavirostris costaricensis*) *Eupherusa* (*Elvira*) *cupreiceps*, Ann. Lyc. N. Y., 1866, p. 344; *Glaucis æneus* (*G. hirsuta æneus*), *Eupherusa* (*Callipharus*) *nigriiventris*, Proc. Acad. Nat. Sci. of Phila., 1867, p. 232; *Philydor* (*Hyloctistes*) *virgatus*, *Helimaster* (*Eugenes*) *spectabilis*, *Pheucticus tibialis* (Baird MS.), Ann. Lyc. N. Y., 1867, p. 466; *Doricha* (*Calliphlox*) *bryantæ*, *Oreopyra cinereicauda*, Ann. Lyc. N. Y., 1867, p. 483; *Heliodoxa henryi* (*H. jacula henryi*), Ann. Lyc. N. Y., 1867, p. 400. A few additional forms were described which later proved to be synonyms.

In 1868 with the appearance of Mr. Lawrence's "Catalogue of the Birds of Costa Rica" we have the first attempt at the publication of a complete list of the birds of that country, although it does not contain the sea-birds, which the author announces his intention to enumerate later. This catalogue contains five hundred and ten species, about thirty-nine of which are now known to be synonyms, leaving a total of about four hundred and seventy-one species, of which sixty-three are probably migrants. In this list the following forms are described as new: *Basileuterus melanotis*, *Phænicothraupis* (*Chlorothraupis*) *carmioli*, *Mionectes olivaceus*, *Trogon bairdi*, *Chlorænas* (*Columba*) *subvinacea*, *Geotrygon costaricensis*, *Tinamus* (*Nothocercus*) *frantzii*, and *Pogonotriccus* (*Idiotriccus*) *zeledoni*. It is a curious fact that up to this time, after eight or ten years of collecting in Costa Rica by such competent men as had been in the field, that not a single specimen of swift is recorded, Mr. Lawrence saying that *Streptoprocne zonaris* should be found there as it occurred to the north and south of that country. In the introduction to his Catalogue Mr. Lawrence gives lists of species known to exist in Chiriquí and Veragua and which he thinks will be found in Costa Rica by future collectors. How good his judgment was is seen from the fact that of the eight species of birds from Chiriquí five have since been added to the Costa Rican ornis, while out of the thirty-eight Veraguan forms twenty-two are now known to inhabit Costa Rica.

In the *Ibis* for 1869, p. 310, Mr. Salvin gives additions and corrections to Lawrence's Catalogue as follows: Fourteen species were removed for various reasons as not properly belonging to the fauna of Costa Rica, while thirteen were added which had been overlooked by Mr. Lawrence. Errors in nomenclature were corrected in the case of seven species. As a result Mr. Salvin leaves the list with just one species less than given in the "Catalogue" of Lawrence, viz: five hundred and nine species.

In the *Ibis* for 1870, p. 107, Mr. Salvin gives additional corrections and additions to Mr. Lawrence's Catalogue, and after supplying some critical notes on the nomenclature of a few species (some of which have subsequently been found erroneous), he gives a list of nineteen species not hitherto recorded from that country, a portion of which had been described as new by himself, and others of which had previously been taken in Chiriquí, or other places to the north of Costa Rica. At the end of the article he sums up the results as follows:

	Species.
Number as given in Lawrence's list, with appendix.....	511
Additions by Salvin in <i>Ibis</i> for 1869 (less two included by Lawrence in his appendix) .....	11
Additions by Salvin, <i>Ibis</i> , 1870.....	19
Total .....	541

	Species.
Deduct six Veraguan species of Hummingbirds.....	6
Also 14 species in Salvin's paper of 1869.....	14
Also <i>Capito hartlaubi</i> (synonym) in Salvin's paper of 1869.....	1
	21
Total species remaining.....	520

In the year 1869 Dr. A. von Frantzius published in the *Journal für Ornithologie*, under the title of "Ueber die geographische Verbreitung der Vögel Costaricas und derer Lebensweise," a list of the birds of Costa Rica with introductory remarks on the geography of the country and the fauna in general. He divides Costa Rica into four faunal areas as follows: (1) The "Meer- und Strand-region"; (2) The Tropical Lowlands extending to an altitude of 2,000 feet; (3) The Subtropical Region, from 2,000 to 6,000 feet; and (4) The Mountain Region, all over 6,000 feet.

(1) This region seems to include only the bare sea-coast, with the lagoons and estuaries inhabited by water- and marsh-birds; (2) is the

coastal plain and slopes up to 2,000 feet; and (3) is the highlands ("hochebene") of San José, with surrounding towns and villages, such as Heredia, Alajuela, San Juan, Mojón, Guadalupe, San Antonio, Los Anonos, Santa Ana, Pacaca, Atenas, Desmonte and Aguacate; and in the vicinity of Cartago, the outlying villages of Orósi, Navarro and Agua Caliente. He asserts that the bird-fauna of Costa Rica is of South American origin, which is true only in part.

No attempt is made to differentiate the Caribbean and Pacific faunæ, in fact at that time little was known concerning the fauna of the Caribbean lowlands. The list contains very little original matter, a greater portion of it being taken from Lawrence's Catalogue, published the previous year, which he has followed in the nomenclature used, and the order of families and genera.

During the years 1867 and 1868 appeared "Exotic Ornithology," by Sclater and Salvin, which has an indirect bearing on the ornithology of Costa Rica, in that it contains descriptions and plates of twenty-four species of birds now known to inhabit Costa Rica, but of which at the time of publication only a part had been taken in that country.

From 1870 until 1878, a few small papers appeared, but nothing of much importance. In the Proceedings of the Zoological Society of London for 1878, Mr. Adolph Boucard published the results of a collecting trip made in Costa Rica during the previous year. A list of the species taken is given together with a description and plate of *Junco vulcani*. Mr. Boucard spent several months in Costa Rica, collecting at Puntarenas (where he took the type of *Agyrtria boucardi*), San José, Cartago, Orósi, Navarro, Volcan de Irazú, Juan Viñas and on the San Carlos River, probably at the Commandancia de San Carlos. His list is well arranged and gives much valuable information on the distribution of the species.

In 1881 Mr. Nutting spent some time in Costa Rica, collecting for the United States National Museum at La Palma de Nicoya, San José, and on the Volcan de Irazú. Lists of the species collected were published in the Proceedings of the United States National Museum for the year 1882; the list of species from La Palma being prepared by Mr. Nutting and that from San José and Irazú by Mr. Ridgway with notes by Nutting.

In the same year Señor don José Zeledón, the eminent Costa Rican ornithologist, published a list of the Birds of Costa Rica, entitled "Catalogo de las Aves de Costa Rica," which is very complete and

well worked out according to the nomenclature of that period. This was published by the Museo Nacional de Costa Rica.

In 1885 Señor Zeledón published in the Proceedings of the United States National Museum, another bare list of the species of birds inhabiting Costa Rica, merely giving additions to his list of 1882 and making corrections in nomenclature. He also indicates the species which were contained at that time in the collection of the United States National Museum.

Two years later Señor Zeledón again published a catalogue of the birds of Costa Rica entitled "Catalogo de las Aves de Costa Rica." This was published in the Anales del Museo Nacional de Costa Rica, and under each species are given the localities at which it was taken and the number of specimens from each locality which are in the collection of the Museo Nacional de Costa Rica. The well-known reliability of Señor Zeledón makes this list very valuable to the student of distribution.

The next contribution we have is the published results of an exploring trip into the Térraba Valley by Mr. Cherrie during the years 1891-2. It was published by the Costa Rican Government and entitled "Exploraciones Zoológicas efectuadas en la parte meridional de Costa Rica por los años de 1891-2; Aves, I, 1893." This is a list of the birds taken on the trip and adds about twelve species to the Costa Rican ornithology, some of which have subsequently been described as new species or subspecies, chiefly by Mr. Bangs. The same year appeared a little pamphlet by Mr. Cherrie giving the results of a collecting trip to the Rio Naránjo. Both of these lists are very reliable and give considerable information concerning most of the species listed, but both have been generally overlooked by subsequent writers on the ornithology of that country.

In 1890 and 1892 Mr. Cherrie also published lists of the birds found in the vicinity of San José, with notes on their habits, breeding, and song, where such information was available. He also published several papers in the Proceedings of the United States National Museum on various species of Costa Rican birds, in which quite a number of new forms were described, and critical notes given on others.

Mr. Cherrie spent about five years in Costa Rica, employed by the Government at the Museo Nacional, during which time he did a great deal of collecting and added much to our knowledge of the fauna of the country.

At about the same time that Mr. Cherrie went to Costa Rica (1890) Mr. C. F. Underwood also arrived there, having been induced to go through the efforts of Señor Zeledón, and he has been collecting birds, mammals, etc., more or less continuously since that time. Enormous quantities of birds were sent to England and other parts of Europe, his skins being found in nearly every collection of importance in Europe. Very few ever found their way to this country until 1907, when Mr. Bangs received a large collection from the Térraba Valley, from which eight new species and subspecies were described. The same year Mr. Bangs secured Underwood's entire old collection of birds, which he had been building up for many years, which contained most of the rare species found in that country, and many specimens which had been identified personally by Salvin. It is of the greatest benefit to American ornithologists to have this magnificent collection of Costa Rican birds in the United States.

Mr. Underwood collected again in the upper Térraba Valley the following year and in various parts of northwestern Costa Rica, visiting Bolson, Coralillo, Tenorio, Cerro de Santa Maria, and La Vijagua, the specimens from all of these localities going to Mr. Bangs. In 1899 Mr. Underwood published (under the Museo Nacional de Costa Rica) a list of the birds of Costa Rica, which contains 696 species. There are some synonyms, some species erroneously included, and some errors in nomenclature, but on the whole it is a very complete list and a useful guide to the collector in that country. It cannot be quoted, for the reason that it is a bare list with no authority for the species included, no specimens being cited or authors named. Mr. Underwood was connected for some years with the Museo Nacional as a collector and taxidermist, many of the birds and mammals now on exhibition in that museum having been mounted by him. In 1896 Mr. Underwood published in the *Ibis* a list of the birds taken on the slopes of the Volcano de Miravalles and in Guanacaste, with notes on habits, abundance, etc., which is of considerable value.

During this same period (1890 to 1896) numerous papers appeared in the Proceedings of the United States National Museum by Mr. Ridgway and Señor Zeledón on the birds of Costa Rica, in which quite a number of new species were described and much additional information on distribution, nomenclature, and the status of species was given.

Señor don Anastasio Alfaro, the present director of the Museo



Nacional de Costa Rica, also began collecting and working on the birds of his native country about the time that Mr. Cherrie and Mr. Underwood began their work, and from that time on he has done a great deal, but unfortunately has written very little.

During the past two years Mr. Outram Bangs has published several papers on Costa Rican birds, describing quite a number of new forms and untangling several knotty points in status and nomenclature affecting species of that country, as well as giving the geographical distribution of many of the forms. His previous papers on the birds of Chiriquí collected by W. W. Brown, are of the greatest assistance to the student of the birds of Costa Rica, because many forms described in these papers have since been found to inhabit southwestern Costa Rica.

The "Biologia Centrali-Americana, Aves," by Messrs. Salvin and Godman, naturally includes most of the species found in Costa Rica, but this work was begun at a time when the knowledge of the birds of that country was in a rather fragmentary condition, and consequently many errors are present in the work. Following the theory of most of the European ornithologists, the authors fail to recognize subspecies, and place many forms in synonymy which are perfectly good, and give specific rank to others which are in many cases barely entitled to subspecific rank. In spite of this, the work is of great value to ornithologists.

The last and by far the greatest and most important contribution which we have to the ornithology of Costa Rica is the magnificent work by Mr. Robert Ridgway "The Birds of North and Middle America," four volumes of which have already appeared, while the fifth will be published in a short time. Mr. Ridgway has exercised the greatest care in this work, and it is especially important to Costa Rica, from the fact that Mr. Ridgway has made two extended trips to that country for the purpose of securing additional material for his work, and has obtained a great deal of useful information at first hand, which will enable him to treat the remainder of the species of that country not yet published, with greater accuracy.

#### BRIEF RESUMÉ OF THE AUTHOR'S COLLECTING.

I made my first trip to Costa Rica in the spring of 1902 in company with Prof. Lawrence Bruner of the University of Nebraska and Mr. Merritt Cary, later a member of the staff of the United States Biological Survey. I spent a portion of March and the whole of April

at the hacienda of Señor don Ricardo Jiménez, on the Volcano de Irazú, collecting chiefly between the altitudes of 8,000 and 10,000 feet. The last two weeks of March were spent at Juan Viñas, where the collecting was all done in the vicinity of the railway station and down in the gorge of the Rio Reventazón.

On the first of May I started with Mr. C. F. Underwood on a trip to Pózo Azul de Pirrís, lasting two and a half months, after the conclusion of which I returned to the United States. All the birds collected on this trip were sent to the Carnegie Museum.

In the spring of 1903 I returned to that country, accompanied by Mr. J. C. Crawford, now Assistant to Dr. Howard, Chief of the Division of Entomology of the United States Department of Agriculture. We collected during the latter part of February and the whole of March around Guápiles, at the terminus of the Old Line Railway. In April, after collecting a few days at Guácimo, we penetrated into the foothills at the northern base of the Volcan de Turrialba, spending two weeks at a point about 2,000 feet above sea-level in the heart of the virgin jungle. The illness of Mr. Crawford prevented a longer stay at this point, which has an exceedingly rich bird-fauna, and soon after Mr. Crawford was compelled to return to the United States on account of his health.

I did no more collecting until November of that year, when I worked at Guácimo up to the middle of January, 1904, going thence to Talamanca, where one year was spent in intermittent collecting. All my collecting in that region was done along the Sicsola River, between Cuábres and the mouth of that stream. I returned to the Old Line in 1905 and spent from August 10 to September 17 at Carrillo and from September 18 to October 10 at La Hondura, getting splendid series of specimens from both localities. From that time on until March, 1907, I was stationed more or less permanently at El Hogar, eight miles east of Guápiles, and during the time spent there was able to collect a great many rare species as opportunity offered.

However, I was able to spend the time from April 24 to July 1, 1906, in Guanacaste in company with Mr. C. H. Lankester, during which time we collected extensively at Bebedero, Bagaces, and Miravalles, besides securing a few specimens at other points. I am greatly indebted to Mr. Lankester for his assistance to me on this trip, and it is owing to his endeavors that many of the rarer species were secured.

Early in April, 1907, I left El Hogar, going to Juan Viñas, where

I stayed in the village itself, and collected more or less continuously from the tenth of that month until the first of June. During this period (April 25-6) I made my first ascent of the Volcan de Turrialba securing at that time the first specimen of *Junco vulcani* recorded from that peak. I here wish to express my most sincere thanks to Messrs. Thomas and Charles Cochenour, with whom I resided while in Juan Viñas, for their many favors rendered me during my stay there.

The first of June I left for Térraba, collecting a few days at Esparta and at Puntarenas while waiting for the little sailing vessel which was to carry myself and outfit to the Rio Grande de Térraba. After a pleasant trip of three days down the coast and up the river we arrived at El Pózo, where a stop of one month was made. At this point I stayed with a German, named Otto Heinrichs, whom I have to thank for many favors during the time I remained there and for his material assistance in collecting. Leaving El Pózo I proceeded to Boruca, where six weeks were spent. On the twentieth of August I arrived in Buenos Aires, collecting there until the tenth of September, after which three Indian packers were secured and we left for the mountains above Ujarrás, where two weeks were spent and many rare species secured. While at this point we lived in a large cave formed by the projection of an enormous boulder from the side of a steep ridge, and under which the Indians had excavated a roomy cavern.

From this point I returned to Buenos Aires, packed up all specimens and returned at once to the coast, being so fortunate as to meet the sloop which was long overdue, returning to Puntarenas without accident.

October and November were spent in collecting at various points on the Caribbean slope; the Volcan de Turrialba, Juan Viñas, Tucuríqui, Las Mesas, Peralta and Boca Matina, after which I sailed for Boston, U. S. A.

I wish to express my appreciation of the great kindness and hospitality I received almost without exception, in all parts of Costa Rica which I visited. I was treated with the greatest honesty and respect by the people of the rural districts. I also wish to thank the government officials with whom I came in contact for their courtesy and help on many occasions, and the officers and employes of the United Fruit Company for the privileges and help extended to me while working on their farms. I also wish to take this opportunity to express my thanks for the assistance I have received from various friends

in the preparation of this paper on the birds of Costa Rica. My thanks are due to Mr. Ridgway and Dr. Richmond of the U. S. National Museum for the privilege of examining specimens of Costa Rican birds in that collection, and for help in determining species and difficult points in nomenclature. I wish to thank Mr. Stone and Mr. Rehn of the Academy of Natural Sciences of Philadelphia, and Dr. Allen and Mr. W. D. Miller of the American Museum in New York, for assistance in looking over specimens in those museums. I thank Mr. Ogilvie-Grant, Curator of Birds in the British Museum, for information furnished me concerning skins in that collection, and M. Eugene Simon, of Paris, for assistance in settling the status of several species of rare and little known humming-birds. My thanks are also due to Señor don José Zeledón, Mr. C. H. Lankester, and Mr. C. F. Underwood, of Costa Rica, for much valuable information concerning the geographical distribution of species and information enabling me to locate with certainty many names of localities used by the various Costa Rican collectors, including themselves. To Mr. J. H. Fleming of Toronto, Ontario, I am indebted for a list of the Costa Rican specimens in his collection.

Mr. W. E. C. Todd, Custodian of Birds and Mammals in the Carnegie Museum, has also given me much assistance, dating from the time I began my second trip to Costa Rica in 1903 and continued during the year spent as his Assistant in the Carnegie Museum.

My thanks are especially due to Mr. Outram Bangs of Boston, Mass., who has aided me in every possible way in the preparation of this manuscript, allowing me the great privilege of the use of his library and entire collection of birds, helping me in the solution of vexing problems, and giving helpful criticism as the work progressed.

Lastly, I wish to express my thanks to Dr. W. J. Holland, Director of the Carnegie Museum, through whose efforts all the material accumulated during the five years of my stay in Costa Rica was brought together at the Carnegie Museum, and through whose encouragement and financial assistance I have been enabled to complete the manuscript of this paper. Dr. Holland on the eve of my departure for South America has also agreed to undertake the laborious task of revising the manuscript and of reading the proof as the pages come from the press.

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## LIST OF COSTA RICAN BIRDS.

## Family TINAMIDÆ.

1. *Tinamus robustus robustus* Sclater.

*Tinamus robustus* SCLATER, *Proc. Zool. Soc. Lond.*, 1860, 253 (Mexico, Orizaba, [Sallé]). — LAWRENCE, *Ann. Lyc. N. Y.*, IX, 1868, 140, *part.* (San Carlos [J. Carmiol]). — SCLATER and SALVIN, *Exotic Ornith.*, Plate XLIV.

Carnegie Museum: Cuábre, ♂ (Carriker). One skin.

Twelve skins of *Tinamus robustus* were examined, from various localities ranging from the Sicsola River to the Nicaraguan boundary, and but one of these was found referable to true *T. robustus*, and agreeing with specimens from Honduras, British Honduras, and Mexico. It seems very probable, in view of these conditions, that practically all Costa Rican birds must be referred to the southern race, *T. robustus fuscipennis*. For notes on habits, etc., see No. 2.

2. *Tinamus robustus fuscipennis* (Salvadori).

*Tinamus fuscipennis* SALVADORI, *Cat. Birds Brit. Mus.*, XXVII, 1895, 500 (Costa Rica, Nicaragua, and Veragua). — SALVIN and GODMAN, *Biol. Centr.-Am.*, Aves, III, 450 (Jiménez and Miravalles [Underwood *in litt.*]).

*Tinamus robustus* UNDERWOOD, *Ibis*, 1896, 449 (Miravalles). — LAWRENCE, *Ann. Lyc. N. Y.*, IX, 1868, 140, *part.* (San Carlos [J. Carmiol]).

*Tinamus salvini* UNDERWOOD, *Bull. B. O. C.*, VII, p. lix; *Ibis*, 1898, 612 (Carrillo).

Bangs Collection: Tenorio, La Vijagua (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum : El Hogar, Rio Sicsola, Carrillo (Carriker). Four skins.

These birds differ exceedingly among themselves in the intensity of coloring both above and below, and in the amount of the dusky markings above. Of the four specimens in the collection, three are very olivaceous on the breast, but one (probably an adult) is paler below with scarcely any olive shading. The wing presents the typical coloration on which the form was based. This bird is from southern Costa Rica (El Hogar), and it seems that birds from farther north are more inclined to intergrade with true *robustus*, the series from La Vijagua being all near it. At the best it seems a rather poor form and is certainly not entitled to more than subspecific rank.

Like all species of the genus, it is found only in the heavy dark forests of the lowlands, is solitary in its habits, very shy and difficult to shoot, rising, when flushed, with a suddenness which fairly takes the breath, and goes hurtling off through the trees with the speed and quickness of a woodcock. Their food seems to be largely of a vegetable nature, such as seeds, small nuts, and some kinds of succulent leaves. It is usually silent during the day, but has a habit of uttering its melancholy call just at dusk. There seems to be no fixed time for laying the eggs, as I have seen them from February to July. No nest is made, the eggs being laid on the ground, usually upon a few leaves, in a slight excavation at the foot of a tree. They are larger than a hen's egg, very ovoid, and of a beautiful blue-green color, and number from four to five.

Ranges over the whole of the Caribbean lowlands, northwestward along the southern slope of Lake Nicaragua to Northwestern Costa Rica and southward on the Pacific coast to the Gulf of Nicoya.

### 3. *Tinamus castaneiceps* Salvadori.

*Tinamus castaneiceps* SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 507, Pl. VI (Lion Hill, Panama [M'Leannan]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 451 (Pózo Azul [Underwood]).—BANGS, Auk, XXIV, 1907, 290 (El Pózo de Terraba [Underwood]).

*Tinamus robustus* ZELEDÓN, Cat. Aves de C. R., 1882, 29; An. Mus. Nac. de C. R., I, 1887, 128 (Pózo Azul de Pirris).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 54 (Palmár and Boruca).

U. S. Nat. Museum : Pózo Azul de Pirris (Zeledón).

Bangs Collection : Pózo Azul de Pirris (Underwood).

Carnegie Museum : Pózo Azul de Pirris and El Pózo de Terraba (Carriker). Four skins.

This is a very distinct species and need not be confused with *T. robustus*, being easily distinguished by the purplish-chestnut color of the crown and hind neck. Neither do they seem to differ so much among themselves as does *robustus*. A very young bird (Pózo Azúl, May 16) much resembles the adult, being more olive below and slightly vermiculated with buff, while above there are very few black bars, buffy spots being numerous on the back and wing-coverts, while the secondaries and tertials are distinctly barred with dusky and rufous.

The Costa Rican range of this bird seems to be the lowlands of the southwest, coming up from Chiriquí and penetrating as far north as Pózo Azúl de Pirrís, possibly farther, although there are no records for its occurrence beyond that point. In this area it has entirely replaced *T. robustus* and the latter is not met with until the more northern portion is reached. Habits similar to *T. robustus*.

#### 4. *Nothocercus frantzii* (Lawrence).

*Tinamus frantzii* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 140 (Cervántes [Zeledón]).—FRANTZIUS, Jour. für Orn., 1869, 374 (Cervántes [Zeledón]).—SALVIN, Ibis, 1874, 312 (Costa Rica).

*Nothocercus bonaparti* BOUCARD, Proc. Zool. Soc. Lond., 1878, 41 (Rio Navárrro).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (Faldas de Irazú).

*Nothocercus frantzii* SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 512 (Irazú [Rogers]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1904, 452 (Asserí, Achiote de Póas, Estrella de Cartago [Underwood]).

U. S. Nat. Museum: Asserí de Irazú, El Achiote de Póas (Alfaro); La Estrella de Cartago, La Palma de San José (Zeledón).

Bangs Collection: Irazú (Underwood).

Carnegie Museum: Volcan Turrialba (4,000 ft.), Ujurrás de Térraba (Carriker). Two skins.

The characters separating this form from *N. bonaparti* seem to be constant and well defined in all the skins examined (seven). It is easily distinguished from all the other Costa Rican *Crypturi* by its black pileum and ruddy underparts.

It is confined exclusively to the highlands and high mountains, seldom ever being seen below an altitude of 5,000 feet. They keep to the heavy forests, while their habits are essentially the same as those of *Tinamus*. At Ujurrás, September 12, a bird was seen with four or five very small chicks, which it would not desert, but kept running and fluttering about in a circle in its endeavors to lure me away from

its young. The chicks hid immediately and after the parent bird was secured not one could be found although diligent search was made. Upon dissection the old bird proved to be a male.

Ranges over the whole of the higher parts of the country, probably being more abundant on the higher peaks, as Irazú, Póas, Barba, Turrialba, etc.

### 5. *Crypturus soui modestus* (Cabanis).

*Crypturus modestus* CABANIS, Jour. für Orn., 1869, 212 (Costa Rica). — FRANTZIUS (do.) p. 374 (C. R.).

*Crypturus pileatus* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 409 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (Las Trojas, Pózo Azul de Pirris, Naránjo de Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 54 (Lagarto, Buenos Aires).

*Crypturus meserythrus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 453 (Jiménez [Underwood]).

*Crypturus soui modestus* BANGS, Auk, XXIV, 1907, 290 (Boruca and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Pirris (Zeledón).

Bangs Collection: Pózo Azul, El General de Térraba, Buenos Aires (Underwood).

Carnegie Museum: Guápiles, Tucurríqui, Cuábre, Buenos Aires (Carriker). Five skins.

While endeavoring to determine the status of the Costa Rican forms of *Crypturus soui*, Mr. Bangs and myself went carefully over his entire series of skins of *C. soui*, and came to the conclusion that there are three very distinct races of this bird ranging from Panama to Mexico, and two forms in the northern part of South America. These may be arranged and characterized as follows:

- a. Under parts uniform cinnamon-rufous, without any dusky band across upper chest.
  - b. Back rich sepia-brown (Venezuela and Guiana). *C. soui soui* (Hermann).
  - bb. Back decidedly chestnut-brown (Santa Marta). *C. soui mustelinus* Bangs.
- aa. Always with a dusky band across upper chest.
  - b. Lower parts decidedly cinnamon- or chestnut-brown, especially on breast.
    - c. Pileum sooty-gray, lower parts quite uniform cinnamon-brown (Panama).  
*C. soui panamensis* n. subsp.
  - cc. Pileum slaty-black, breast bright chestnut (Honduras to Mexico).  
*C. soui meserythrus* (Sclater).
  - bb. Lower parts grayish or sooty-fulvous, pileum slaty-black (Costa Rica, Chiriquí, and Nicaragua (?)). *C. soui modestus* (Cabanis).

### *Crypturus soui soui* (Hermann).

*Tinamus soui* HERMANN, Tab. Aff. Anim. (1783), p. 164 (ex Daubenton, Pl. Enl., 829), Cayenne.

Under parts cinnamon-rufous, richer and darker on flanks, breast, and chest, paler and more cinnamon-ochraceous on throat and abdomen, chin palest; pileum and sides of head sooty-gray, center of crown and occiput darker sooty, sides of head paler; back, scapulars and rump rich sepia-brown, very finely vermiculated with dusky; wing-coverts, tertials, and upper tail-coverts broadly edged with bright chestnut-brown or hazel, a little darker and richer than the color of the chest. Wing, ♀, 122 mm.

This bird agrees well with the plate cited above, upon which the species was based. The description is taken from an adult female collected by Lieut. Wirt Robinson at San Julian, Venezuela, August 8, 1900 (Coll. of E. A. & O. Bangs).

*Crypturus soui mustelinus* Bangs.

*Crypturus soui mustelinus* BANGS, Proc. Biol. Soc. Wash., Vol. XVIII (June, 1905), p. 151.

Lower parts richer and darker than in *C. s. soui*, being rich cinnamon-rufous throughout, almost chestnut on lower throat and chest; throat cinnamon-ochraceous, chin white, feathers tipped with ochraceous; upper parts decidedly chestnut-brown throughout, interscapular region and rump finely vermiculated with dusky; edgings of wing and upper tail-coverts bright chestnut like the sides of the chest, and even the inner secondaries strongly edged with rufous on the outer webs. Wing about 127 mm.

*Crypturus soui panamensis* n. subsp.

Type, adult ♀, Loma del Leon, Panama, Mar. 25, 1900, W. W. Brown, Collector. Collection of E. A. & O. Bangs, No. 7055.

General coloration similar to *C. s. soui*, differing as follows: Chin and upper throat white, feathers slightly tipped with buff on lower portion; lower throat and upper chest dusky grayish-brown, extending around on sides of chest and neck where it becomes darker, blending with color of the back; rest of lower parts more like *C. s. mustelinus* in the intensity of the coloring, but there is always a slight grayish-brown cast. Upper parts very similar to *C. s. soui*, except that the pileum is much darker, being deep sooty, without grayish tinge. Wing averages 130 mm. in ♀, ♂ averages smaller.

Young birds resemble somewhat the adults of *C. s. modestus*, but may be distinguished by the white throat and paler upper parts. Eight specimens.

*Crypturus soui modestus* (Cabanis).

*Crypturus modestus* CABANIS, Jour. für Orn., 1869, 212 (Costa Rica).

Easily distinguished from all other races of *C. soui* by the prevailing dark color both above and below, by the slaty-black pileum and by the absence of rufous edgings on the wings. Chin and upper throat ashy-white; lower throat, upper chest, and sides of neck grayish sooty-brown; rest of lower parts grayish-fulvous or brownish-fulvous, sides of head sooty-gray; upper parts rich seal-brown, feathers slightly edged with blackish, wing-coverts and tertials more olive-brown; upper tail-coverts deep umber or mummy-brown.

Young birds are grayer or browner below, with less fulvous, and sometimes have the wing-coverts tipped with dull rufous. Wing (♀) averages 135 mm. Fifteen specimens from Costa Rica and five from Chiriquí examined.

A single nest of this species was taken at Boruca, August 9, 1907, containing two slightly incubated eggs. The nest was made on the ground at the foot of a shrub in a tract of second-growth woodland. Little attempt at nest-building was shown, merely a slight excavation being made, and lined with a few leaves and grass. The eggs are purplish-drab, unmarked. Measurements:  $42 \times 30$  and  $43 \times 31$  mm.

*Crypturus soui meserythrus* (Sclater).

*Crypturus meserythrus* SCLATER, P. Z. S., 1859, p. 392 (Playa Vicente, Guatemala).

Resembles *C. s. panamensis* in the color of the under parts, except that the breast is brighter chestnut, and the pileum is slaty-black as in *modestus*.

Chin and upper throat white, feathers tipped with cinnamon-ochraceous; lower throat, upper chest, and sides of neck slate-gray, sometimes (in younger birds) washed with olive-brown; lower chest, breast, and flanks rich chestnut-brown, abdomen and sides cinnamon-ochraceous, as in true *soui*; upper parts intermediate in shade between *panamensis* and *modestus*, while the wing-coverts and tertials are strongly edged with dark chestnut as in *panamensis*. On the whole this form greatly resembles *panamensis*, but can always be recognized by the slaty-black pileum, the richer chestnut of the breast and the grayer color of the lower throat. Specimens from Vera Cruz, Mexico, are the most typical of this race and from these the description has been made.



6. *Crypturus cinnamomeus* (Lesson).

*Tinamus* (*Nothura*) *cinnamomea* LESSON, Rev. Zool., 1842, 210 (La Union, Salvador).

*Crypturus sallei* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 374 (Esparta). — NUTTING, Proc. U. S. Nat. Mus., V, 1885, 409 (La Palma de Nicoya).

*Crypturus cinnamomeus* SALVADORI, Cat. Birds Brit. Mus. XXVII, 1895, 541 (Bebedéro, [Arce]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1904, 455 (Costa Rica).

Bangs Collection: Bolson (Underwood).

Carnegie Museum: Bebedéro (Carriker). One skin.

Like all members of the genus they are found singly or in pairs, frequenting the edges of the forest, second-growth timber, or bushy pastures, and are very shy and seldom seen. This species seems confined to the northwestern portion of Costa Rica and is probably to be found throughout the peninsula of Nicoya and Guanacaste, down the eastern side of the Gulf of Nicoya and upwards on the plateau region for a short distance. Although Boucard records a specimen from San Carlos, I do not believe its regular range extends beyond the Pacific watershed, and if it really was taken at San Carlos, it is an unusual occurrence.

7. *Crypturus boucardi* (Sclater).

*Tinamus boucardi* SCLATER, Proc. Zool. Soc. Lond., 1859, 391 (S. Mexico [Boucard]).

*Crypturus boucardi* SALVIN, Ibis, 1870, 115 (Costa Rica [Carmioli]). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 42 (San Carlos, Feb. 1877). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (Pacuare). — SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 544 (Costa Rica [Carmioli]). — UNDERWOOD, Ibis, 1896, 449 (Miravalles, very rare). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 457 (Costa Rica).

Bangs Collection: Cerro de Santa Maria and Tenorio (Underwood).

C. H. Lankester Collection: Guanacaste.

The immature birds of this species have a marked resemblance to the adults of *C. cinnamomeus* in the barring of the wings and lower back, so that it is not impossible that the bird collected by Boucard at San Carlos and called *C. cinnamomeus* should really be referred to the present species.

The species seems to be found in the thick forest more than either of the other two species of the genus, resembling *Tinamus* in its habits more than *Crypturus*. There are very few records of its occurrence

in Costa Rica, but from what we have it is evident that it ranges over the lowlands of both coasts, on the Pacific from Nicaragua down as far as Pózo Azul de Pirris (at least), and on the Caribbean from Nicaragua as far down as the Pacuare River and perhaps farther.

### Family CRACIDÆ.

#### 8. *Crax panamensis* Ogilvie-Grant.

- Crax globicera* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 139 (San José [Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 373 (San José and Sarapiquí). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 42 (San Carlos, Vol. Irazú and Naránjo). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 408 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (Costa Rica). — CHERRIE, Expl. Zool. en C. R., 1891-2 (Palmár, common); Expl. Zool. Rio Naránjo, 1893 (Pózo del Pital). — UNDERWOOD, Ibis, 1896, 448 (Miravalles).  
*Crax panamensis* OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 479 (Valsa [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 273 (Costa Rican references). — BANGS, Auk, XXIV, 1907, 290 (El Pózo de Terraba [Underwood]).

Carnegie Museum: Guácimo (Carriker). One female.

All Costa Rican birds have the tail strongly barred, thus being typical *C. panamensis*. This bird ranges over the whole lowland region of the country from sea-level up to an altitude of not more than 2,000 feet, but is more abundant below 1,000 feet. They keep to the heavy forests, feeding on the ground as well as in the trees, and when flushed from the ground always alight in a tall tree where they will remain perfectly quiet if they think they have not been seen. They are now becoming quite scarce in nearly all parts of the country on account of their continuous pursuit by all classes of hunters, their flesh being excellent. I have never been able to learn anything about their breeding habits, but they very probably place their nest in some large tree after the manner of other Curassows.

#### 9. *Penelope cristata* (Linnæus).

- Meleagris cristata* LINNÆUS, Syst. Nat., i, 269 (1766).  
*Penelope purpurascens* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 139 (Barranca and Angostura [J. Carmiol], La Palma [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 372 (C. R.). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 42 (San Carlos and slopes of Irazú).  
*Penelope cristata* SALVIN, Ibis, 1869, 317 (crit.); Proc. Zool. Soc. Lond., 1870, 525 (crit.). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 409 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (Jiménez

and Naránjo de Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2 (Palmár). — CHERRIE, Expl. Zool. Rio Naránjo, 1893, 8 (Pózo del Pital). — UNDERWOOD, Ibis, 1896, 448 (Miravalles). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 498 (Valsa [Carmioli], La Palma [Zeledón]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 277 (Costa Rican references). — BANGS, Auk, XXIV, 1907, 291 (El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Bonilla (Ridgway).

Bangs Collection: Pózo Azul (Underwood).

Carnegie Museum: Rio Sicsola, Miravalles, El Pózo de Térraba (Carriker). Five skins.

Specimens from southeastern, southwestern, and northwestern Costa Rica were compared, and show no signs of variation; neither do they differ from birds from Santa Marta, Colombia. The species has a wide range and seems very constant throughout.

Its habits are very similar to those of the preceding species, except that it is much noisier, frequently uttering its loud, characteristic call, always when disturbed and often of its own accord, thus unwittingly guiding the hunter to it. It is more abundant than the preceding, although most persistently hunted, seeming to be more wary and better able to escape. They range over the whole of the lower portion of the country and extend to much higher altitudes than *Crax panamensis*, often being met with up to four or five thousand feet. I shot a fine large bird at Ujurrás de Térraba right up in the territory of *Chamaepetes unicolor*, at not less than six thousand feet above sea-level.

#### 10. *Ortalis cinereiceps* (Gray).

*Ortalida cinereiceps* GRAY, List Gallinæ Brit. Mus., 1867, 12 (N.W. Coast of America). — SCLATER and SALVIN, Proc. Zool. Soc. Lond., 1870, 540 (Costa Rica [Carmioli]).

*Ortalida poliocephala* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 139 (San José [Frantzius], Turrialba [J. Carmioli], La Palma [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 372 (Costa Rica).

*Ortalida frantzii* CABANIS, Jour. für Orn., 1869, 211 (Costa Rica).

*Ortalis cinereiceps* ZELEDÓN, Cat. Aves de C. R., 1882; An. Mus. Nac. de C. R., 1887, 128 (Jiménez and Cartago). — CHERRIE, Expl. Zool. en Costa Rica, 1891-2, 1893, 54 (Buenos Aires); Expl. Zool. Rio Naránjo, 1893, 8 (El Pózo del Pital). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 515 (C. R. [Carmioli], San José [Frantzius]). — UNDERWOOD, Ibis, 1896, 448 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 282 (Irazú [Underwood], etc.). — BANGS, Auk, XXIV, 1907, 291 (Boruca [Underwood]).

U. S. Nat. Museum : Guayábo (Ridgway & Zeledón).

Ac. Nat. Sci. Phila. : Miravalles (Underwood).

C. H. Lankester Collection : Cariblanco de Sarapiquí.

Carnegie Museum : Pózo Azul, Juan Viñas, Cuáb্রে (Carriker). Five skins.

A young male (Pózo Azul, June) has almost the exact plumage of the adult, although the bird itself is still quite small, the measurements as follows: length, 393 mm.; wing, 143 mm.; tail, 168 mm. Birds from various sections of the country show little or no sign of variation. It has practically the same range as the preceding species, through the whole of Costa Rica up to an altitude of perhaps not more than 5,000 feet, but being in greatest abundance at lower altitudes. Unlike the larger Cracidæ, they prefer the dense thickets of low, vine-covered jungle, patches of wild cane, and thick second-growth. They are very noisy when disturbed by man or animals, or when they find something unusual. I once heard them making a fearful din in a small patch of second-growth jungle, and upon carefully working my way inside, found a flock of about a dozen of them running frantically backward and forward along the limbs of a small tree, in the center of which hung a sloth (*Bradypus castaneiceps*). The sloth was watching them with open mouth, turning his head about, but apparently not greatly disturbed. The nest is built in a low tree or in the midst of a clump of vines. A nest was found on the Rio Sicsola, Oct. 6, 1904, placed in a large fork of a tree, about eight feet from the ground, and resting on a mat of vines, while the tree was growing in the midst of a patch of wild cane beside a lagoon. The female was incubating three eggs, which were creamy-white, the shell filled with fine punctures, making it very rugose. Eggs average  $54 \times 40$  mm.

# 11. *Chamæpetes unicolor* Salvin.

(Native name "Pava Negra.")

*Chamæpetes unicolor* SALVIN, Proc. Zool. Soc. Lond., 1867, 159 (Veragua). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 139 (La Palma [Frantzius], Rancho Redondo [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 372 (La Palma). — SCLATER and SALVIN, Proc. Zool. Soc. Lond., 1870, 531 (Costa Rica [Carmioli]). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 42 (Volcan Irazú). — ZELEDÓN, Cat. Aves de C. R. 1882; An. Mus. Nac. de C. R., 1887, 128 (Rancho Redondo). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 522 (San José [Frantzius], Irazú [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 278 (Costa Rican references).

C. H. Lankester Collection: Vara Blanca de Sarapiquí.

Carnegie Museum: Volcan Turrialba (8,000–9,000 feet), Ujurrás de Térraba (Carriker). Three skins.

The single female in the collection seems to be more greenish above than the males, which have a decidedly dark metallic-blue tinge. As Mr. Ogilvie-Grant suggests (Cat. Birds Brit. Mus., XXII, 522), the rufous edgings of the feathers on the lower parts is evidently due to immaturity, as several young birds taken on the Volcan Turrialba (not made into specimens) had it to a great degree, while it even persists after the upper parts have assumed the adult plumage.

The present bird is confined wholly to the high mountains, probably rarely descending below 5,000 feet, while it is more abundant on the volcanoes at a point near timberline where certain trees and shrubs abound, of the fruit of which it is very fond. I rarely ever saw the bird on the ground, their manner of feeding seeming to be confined to climbing about among the limbs of the trees and picking off the fruit. While feeding they are always very quiet and the mere presence of a person under the tree will not cause them to fly, although they usually cease feeding. Their flesh is tender and of excellent flavor, and were it not for the fact that they inhabit such inaccessible regions they would have been exterminated long ago.

#### Family ODONTOPHORIDÆ.

##### 12. *Dendrortyx hypospodius* Salvin.

(Native name "Chirisqua.")

*Dendrortyx leucophrys* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 140 (Las Cruces, Candelaria Mountains [Zeledón], Dota [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 373 (Póas and Dota). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 42 (Volcan de Irazú, 7,000 ft.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (La Palma de San José). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 394 (Costa Rica).

*Dendrortyx hypospodius* SALVIN, Bull. B. O. C., VI, p. v (Azahar de Cartago [Underwood]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 290 (Alajuela, Estrella, La Palma de San José [Underwood *in litt.*]).

Fleming Collection: Volcan de Irazú (Underwood).

This bird, though closely related to *D. leucophrys*, is apparently a good species. It is a very rare bird in Costa Rica and I have never observed it in life. From the records of its collection, and from what I was able to learn from the natives, it is confined to the higher portions of the country, probably from 4,000 feet upwards.

13. *Eupsychortyx leylandi* (Moore).

(Native name "Perdiz.")

*Ortyx leylandi* MOORE, Proc. Zool. Soc. Lond., 1859, p. 62 (Omoa to Comayagua, Honduras). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 139 (San José and Barranca [Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 373 (Heredia and Barba). — BOUCARD, Proc. Zool. Soc. London, 1878, 42 (Valley of San José).  
*Colinus leylandi* CHERRIE, Auk, 1892, 329 (San José, common resident). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (San José and Alajuela).  
*Eupsychortyx leylandi* OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 411 (Costa Rica [Endres, J. Carmiol and Capt. Dow], Irazú District [Rogers]). — UNDERWOOD, Ibis, 1896, 449 (Miravalles, common). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903 (Estrella de Cartago [Underwood]).

U. S. Nat. Museum: Santo Domingo de San Mateo (Ridgway); Alajuela, San José.

Bangs Collection: San José, Tenorio (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Miravalles (Carriker). One skin.

A common bird throughout the plateau region and the western slope, extending over Nicoya and Guanacaste wherever suitable conditions are to be found. Like our Bob-white it is a bird of the fields and cultivated districts and its habits are essentially the same, even its call being quite like that of the Virginian Quail.

## KEY TO THE COSTA RICAN SPECIES OF ODONTOPHORUS.

- a.* Lower parts chestnut-brown, unmarked, throat black. *melanotis.*
- aa.* Lower parts spotted with white or vermiculated with black, or else breast mostly black.
  - b.* Throat black, streaked with white, lower parts spotted with white.
    - c.* Lower parts grayish-brown, white spots edged with black. *guttatus.*
    - cc.* Lower parts dull chestnut-brown, white spots small, not edged with black. *veraguensis.*
  - bb.* Throat concolorous with lower parts, or else with a conspicuous white patch.
    - c.* Chin, malar region, and lores chestnut-brown, lower parts grayish-brown, freckled with black and buff. *castigatus.*
    - cc.* Chest and breast almost wholly black, with scattering white spots on breast, partly concealed, throat with a white patch. *leucolæmus.*

14. *Odontophorus castigatus* Bangs.

*Odontophorus marmoratus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887 (Las Trojas and Pózo Azul de Pirris). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 54 (Boruca, Buenos Aires, common, but difficult to secure). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 309 (Costa Rica, Zeledón's reference).

*Odontophorus castigatus* BANGS, Auk, XVIII, 355 (Divála, Chiriquí [Brown]); Auk, XXIV, 1907, 291 (Boruca and El Pózo de Térraba [Underwood]).

Bangs Collection: Sabanilla (Underwood).

Carnegie Museum: El Pózo de Térraba, Boruca (Carriker). Three skins.

Specimens from El Pózo compared with the type from Divála, Chiriquí, were found to agree perfectly, while the same birds when compared with *O. marmoratus* (from which it was separated) were found to be very different, and I see no reason for placing this species under the synonymy of *O. marmoratus* as was done by Messrs. Salvin and Godman.

It is found only in the southwestern portion of Costa Rica, occupying the Pacific lowlands, up to about 2,000 feet, from Chiriquí north to Pózo Azul, and perhaps a little farther. It is strictly a denizen of the forest and prefers the thick jungle, wild plantains, and tangled undergrowth to the more open forest. They are almost always to be seen in small coveys, and when flushed usually alight in the low trees and sit perfectly still for some time before flying off again.

#### 15. *Odontophorus melanotis* Salvin.

*Odontophorus melanotis* SALVIN, Proc. Zool. Soc. Lond., 1864, 586 (Tucurriquí [Arcé]). — FRANTZIUS, Jour. für Orn., 1869, 374 (Dota and Candelaria). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 140 ("Tucurriquí [Arcé]," coll. of O. Salvin). — ZELEDÓN, An. Mus. Nac. de Costa Rica, I, 1887, 128 (Jiménez). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 433 (Tucurriquí [Arcé]). — UNDERWOOD, Ibis, 1896, 449 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 310 (Costa Rican references).

U. S. Nat. Museum: Bonilla (Ridgway); Talamanca (Cherrie); Jiménez (Alfaro).

Bangs Collection: Carrillo, Tenorio (Underwood).

Carnegie Museum: Guápiles, Guácimo, Cuábre, Río Sicsola, El Hogar (Carriker). Six skins.

A female from Talamanca has a much brighter rufous pileum than all the birds from northeastern Costa Rica, which have the crest feathers shaded with dusky towards the tips. This may be due to age, for otherwise they appear the same. An immature female from Río Sicsola is quite different from the adult, as follows: the tertials, scapulars, and interscapular region broadly marked with black sub-terminal bars on each feather, the black bars bordered on either side by a narrow bar of buffy or pale rufous; only the middle of the breast

chestnut, with short, broken, black bars on each side; lower breast dull grayish-brown, indistinctly barred with dusky, while the chest is brokenly barred with cinnamon-brown and black, throat dull blackish; maxilla brown, mandible black.

Rather common in the thick forests of the Caribbean lowlands, up to about 2,500 feet, extending northwestward along the southern slope of Lake Nicaragua, over to the Pacific slope of the northern part of the country only.

Habits essentially the same as those of the preceding species. A single nest was observed on the Rio Sicsola, September 21, 1904. It was a slight excavation at the foot of a tree, between two spur roots, lined with leaves and grass and contained four badly incubated eggs. The eggs are creamy-white, unmarked, and shaped very much as the eggs of the Bob-white. Measurements:  $40 \times 29$  mm.

#### 16. *Odontophorus leucolæmus* Salvin.

*Odontophorus leucolæmus* SALVIN, Proc. Zool. Soc. Lond., 1867, 161 (Cordillera de Tole, Panama [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 140 (San José [Frantzius and Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 374 (Dota and Candelaria). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (Naranjo de Cartago). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 438 (Dota [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903 (Costa Rican references).

U. S. Nat. Museum: La Estrella.

Bangs Collection: Volcan de Irazú, Cariblánco, Azahar de Cartago, Tenorio (Underwood).

Fleming Collection: Azahar de Cartago and Cariblánco de Sarapiquí (Underwood).

Carnegie Museum: La Estrella de Cartago and La Hondura (Carriker).  
Two skins.

These birds, apparently from age, differ much among themselves in the amount of black and white on the breast and chest. Some have numerous white spots on the breast, others have scarcely any; some have the flanks black, each feather edged with cinnamon-brown, others with the sides brown and the flanks rufous, finely vermiculated with black; some also have the back and pileum decidedly brown and in others it is quite gray.

This species seems to prefer the eastern portion of the highlands and the upper part of the Caribbean slope, between the altitudes of 3,000 and 6,000 feet. Like all other species of the genus it is an



inhabitant of the forest, congregates in small coveys, and keeps to the thickest parts of the jungle.

17. ***Odontophorus guttatus*** (Gould).

*Ortyx guttata* GOULD, Proc. Zool. Soc. Lond., 1837, 79 (Bay of Honduras [Barlow]).

*Odontophorus guttatus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 140 (Dota [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 374 (Dota and Candelaria). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 42 (Curridibat). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (Sarchí de Alajuela, El Zarcero de Alajuela and Alajuela). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893, 439 (Barranca and Dota [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 311 (Irazú [Underwood], etc.).

U. S. Nat. Museum: La Estrella de Cartago and Irazú.

Bangs Collection: Volcan de Irazú and Azahar de Cartago (Underwood).

Carnegie Museum: Volcan de Irazú (Carriker). One skin.

This species takes the place of the preceding at higher altitudes, although their ranges slightly overlap, the present form being found over the whole of the country from 5,000 feet to timberline. It is more abundant in the northern portion of the country, since in the southern part its range is invaded by *O. veraguensis*. I found it on the Volcanoes Turrialba and Irazú, more abundant at above 7,000–8,000 feet, frequenting the bamboo-choked ravines, where it was exceedingly hard to shoot. They have a low whistling call, which is not often heard, and seems to be used principally for calling together the scattered covey, after the manner of our quail.

18. ***Odontophorus veraguensis*** Gould.

*Odontophorus veraguensis* GOULD, Proc. Zool. Soc. Lond., 1856, 107 (David, Chiriquí [Seeman]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 140 (Dota and Barranca [J. Carmiol], Las Cruces de Candelaria [Zeledón]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 128 (Las Cruces de Candelaria). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXII, 1893 (Dota [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 312 (Costa Rican references).

Bangs Collection: Volcan de Irazú (Underwood).

Carnegie Museum: Ujurrás de Térraba (Carriker). Two skins.

It is a very unusual occurrence to find two such closely related species occupying the same range as is found in the case of *O. guttatus* and *veraguensis*. *O. guttatus* is the northern form, going as far south

as some point in southern Chiriquí, probably to the Volcan de Chiriquí, while the present species is a southern form, coming up from Panama into Costa Rica, probably as far as Irazú, but being more abundant in the mountains of southern Costa Rica. Both birds occur together on the Volcan de Chiriquí. Its habits are apparently the same as those of the preceding species.

### Family COLUMBIDÆ.

#### KEY TO THE COSTA RICAN SPECIES.

- a.* Under tail-coverts white or largely white (never with black malar stripe).
  - b.* Rectrices more or less broadly tipped with white.
    - c.* Chin and upper portion of throat white or ashy-white.
      - d.* Lower throat and chest rich chestnut-maroon; upper parts slaty-blue. *Claravis mondetoura*, ♂.
      - dd.* No chestnut-maroon on throat or chest, light slaty-blue or pale drab.
        - e.* Whole of pileum and hind-neck slaty-blue; belly and flanks white. *Leptotila plumbeiceps*, ♂ & ♀.
        - ee.* Hinderpart of pileum and nape olive-brown, like back; only center of belly white. *Leptotila cassini vinaceiventris*, ♂, ♀.
    - cc.* Chin and upper throat not white, nearly or quite concolorous with chest.
      - d.* Tail long and pointed; inner secondaries and tertials spotted with black. *Zenaidura carolinensis*, ♂ & ♀.
      - dd.* Tail normal, slightly rounded; no black spots on tertials or secondaries.
        - e.* Outer wing-coverts and secondaries broadly edged with white, forming a prominent white wing-patch. *Melopelia asiatica*, ♂ & ♀.
        - ee.* No white on wings; chest buffy-vinaceous, breast buffy-ochraceous; back and wings grayish olive-brown. *Leptotila verreauxi*, ♂ & ♀.
  - bb.* No white on rectrices.
    - c.* Tail ashy-blue or chestnut-brown.
      - d.* Tail chestnut; breast and belly creamy-white; interscapular region violet-purple; back and wings purplish-chestnut. *Geotrygon albiventer*, ♂.
      - dd.* Tail ashy-blue; crown and nape metallic-green; mantle and chest reddish-vinaceous; rump slaty-blue. *Columba rufina*, ♂ & ♀.
    - cc.* Tail sooty-black; feathers of hind-neck, breast, and fore-neck edged with metallic-green and purple, with white or cinnamon centers exposed; back and wing-coverts chestnut-purple. *Columba speciosa*.
- aa.* Under tail-coverts not white (tipped with grayish-white in *Columba albilinea crissalis*).
  - b.* Size small (wing not more than 100 mm.).
    - c.* Feathers of chest and fore-neck with partly concealed dusky centers. *Chamepelia passerina neglecta*.

cc. No dusky centers to feathers of chest.

d. Small (wing not over 75 mm.); violet spots on wing-coverts and tertials. *Chamepelia minuta*.

dd. Larger (wing about 90 mm.); short black bars on tertials; upper parts chestnut-brown (male) or olive-brown (female); below bright vinaceous (male) or buffy-drab (female).

*Chamepelia rufipennis rufipennis*.

bb. Larger (wing not less than 115 mm., usually more).

c. Lower parts largely slaty-blue, ashy-blue, or cinnamon-brown.

d. Lower parts slaty- or ashy-blue.

e. Entire upper parts slate-blue; wings spotted with black.

*Claravis pretiosa pretiosa*, ♂.

ee. Upper parts not slate-blue; nape and hind-neck metallic-green, interscapular region violet-purple; a black malar stripe.

f. Wing-coverts, posterior portion of interscapulars, and rump chestnut-brown. *Geotrygon costaricensis*, ♂ & ♀.

ff. Wings, lower back, and rump dark metallic olive-green.

*Geotrygon lawrencei*, ♂ & ♀.

dd. Lower parts largely cinnamon-brown.

e. Pileum and nape slaty-blue; wings, rump, and tail dark chestnut-brown. *Geotrygon chiriquensis*, ♂ & ♀.

ee. Pileum same color as wings and lower back, light cinnamon-brown. *Geotrygon montana* ♂.

cc. Lower parts not slaty-blue or cinnamon-brown.

d. Under parts entirely deep purplish-vinaceous, or else with the abdomen and under tail-coverts slaty-blue.

e. Under parts entirely purplish-vinaceous; pileum and nape color of breast.

f. Back, wings, rump, and tail vinaceous-brown.

*Columba subvinacea*, ♂ & ♀

ff. Upper parts grayish-olive.

*Columba nigristrois brunneicauda*.

ee. Only chest and breast purplish-vinaceous; abdomen blue.

*Columba flavistrois minima*, ♂ & ♀.

dd. Under parts not as above.

e. Upper parts dark metallic olive-green.

f. Chest metallic-green; flanks and under tail-coverts cinnamon-ochraceous. *Geotrygon veraguensis*, ♂ & ♀.

ff. Chest ochraceous-drab; flanks and under tail-coverts pale buffy-ochraceous. *Geotrygon montana*, ♀.

ee. Upper parts grayish-brown or slaty-olive.

f. Smaller (wing about 110); tertials spotted with purple or chestnut-brown.

g. Upper and under tail-coverts chestnut-brown, chest pale grayish-brown, spots on tertials chestnut.

*Claravis pretiosa pretiosa*, ♀.

*gg.* Upper tail-coverts olive-brown like back, lower buffy cream-color; chest dark grayish-olive, spots on wings purple. *Claravis mondetoura*, ♀.

*ff.* Larger (wing 200); a narrow white nuchal collar; hind neck bright metallic-green.

*Columba albilinea crissalis*, ♂ & ♀.

### 19. *Columba speciosa* Gmelin.

*Columba speciosa* GMELIN, Syst. Nat. I, 1788, 783. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Costa Rica). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 281 (Mexico and through Central America to Peru). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 233 (Buenos Aires [Underwood]). — BANGS, Auk, XXIV, 1907, 291 (Boruca and Paso Real [Underwood]).

Bangs Collection: El General de Térraba (Underwood).

Carnegie Museum: Boruca (Carriker). Four skins.

Three males from Costa Rica agree very closely with a single male from Santa Marta, Colombia, and with another from British Honduras, but the single female has the pileum bright cinnamon-rufous, while in birds from British Honduras and Santa Marta it is deep vinaceous, as in the male. This may be due to immaturity, for one very young bird from British Honduras has the fore part of the crown light brown.

This beautiful pigeon is found only in the southwestern part of the country, probably not outside of the Térraba Valley. It is abundant about Boruca and Buenos Aires, where it frequents the second growth woodland and the trees along the borders of the "sabanas." Many young birds were seen about Buenos Aires during August.

### 20. *Columba flavirostris minima* subsp. nov.

*Columba flavirostris* WAGLER, Isis, 1831, 519 (Mexico). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Cartago, Turrialba, Alajuéla and El Zarcéro de Alajuéla). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 285 (Costa Rica [J. Carmiol], Dota [Zeledón]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 234 (Laguna de Coris, Tambor, Cuádro de Irazú, Tres Rios, Sarchí, Candelaria [Underwood]).

*Chloranas flavirostris* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (Barranca [J. Carmiol], Dota [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 370 (Costa Rica).

U. S. Nat. Museum: Guayábo (Ridgway & Zeledón), Coliblanco (Ridgway), Naránjo de Cartago (Alfaro & Zeledón).

Bangs Collection: Juan Viñas and Bolson (Underwood).

C. H. Lankester Collection: Tuís.

Carnegie Museum: Bagáces and Ciruélas (Carriker). Three skins.

Type, No. 27,884, Carnegie Museum Collection of Birds, adult ♂, Ciruélas, Costa Rica, M. A. Carriker, Jr., Collector.

Same as *C. flavirostris flavirostris* of Mexico and Texas, except for its smaller size. Differs from *C. flavirostris madrensis* Nelson, in the same manner as that form differs from true *flavirostris*, viz., in the absence of white edgings on the wing-coverts. Birds from Sinaloa, Mexico, approach *madrensis*.

A series of twenty-seven skins in the Collection of the American Museum of Natural History, from Montemorales, Nuevo Leon, Boquillo, and Tampico, Mexico, and Lomita, Texas, measure as follows: *Female*—wing, 193–203 (195.5); tail, 125–138 (130.5). *Male*—wing, 196–210 (200.5); tail, 131–145 (135). Seven specimens in the Collection of the Carnegie Museum from Brownsville, Texas, measure as follows: *Male*—wing, 195–200 (198); tail, 128–139 (133.5); bill, 14; tarsus, 25–27 (26). *Female*—wing, 191–195 (192); tail, 128–134 (131); bill, 13–14.5 (14.5); tarsus, 25–27 (26). Average measurements for *C. flavirostris flavirostris*: *Male*—wing, 199.2; tail, 134.2; bill, 14; tarsus, 26. *Female*—wing, 193.7; tail, 130.7; bill, 14.5; tarsus, 26.

Of the new form, nine specimens were examined, three in the Collection of the Carnegie Museum from Bagáces and Ciruélas, and six in the Collection of E. A. and O. Bangs, of which five were from Bolson and one from Juan Viñas.

Measurements: *Male*—wing, 171–183 (178); tail, 112–122 (114); tarsus, 22–24 (22.8); bill, 14.5–16 (15).

*Female*—wing, 175–180 (178); tail, 111–120 (116); tarsus, 21–23 (22); bill, 13–15 (14).

Thus it will be seen that while the wing, tail, and tarsus of the Costa Rican bird are decidedly smaller than those of the northern, the bill is actually larger.

The bird ranges over the plateau district, descending on the Caribbean slope to about 2,000 feet, while on the Pacific it goes down practically to sea-level over a large part of Guanacaste and the shores of the Gulf of Nicoya.

## 21. *Columba rufina* Temminck and Knip.

*Columba rufina* SALVIN, Ibis, 1870, 115 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Talamanca). — CHERRIE, Expl. Zool. en Costa Rica, 1891–2, 1893, 53 (Lagarto and Buenos Aires). — SALVADORI,

Cat. Birds Brit. Mus., XXI, 1893, 287 (Costa Rica [Carmioli]). — UNDERWOOD, Ibis, 1896, 447 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 236 (Costa Rican references). — BANGS, Auk, XXIV, 1907, 291 (Paso Real and El Pózo de Térraba, Barranca de Puntarenas [Underwood]).

U. S. National Museum : Pígres (Ridgway).

Bangs Collection : Tenorio (Underwood).

C. H. Lankester Collection : Miravalles.

Carnegie Museum : Guápiles, Coronado de Térraba, Miravalles, Rio Sicsola (Carriker). Four skins.

Specimens from Santa Marta, Colombia, Costa Rica, and British Honduras all agree very well one with another, there being only such differences as would most probably be due to age or individual variation.

This species has a wide range, covering the lowlands of both coasts and the central plateau region up to 4,000 or even 5,000 feet, but is most abundant on the Pacific slope at an elevation of from 1,000 to 3,000 feet. It frequents the trees along the margins of the rivers, or in open woodland, or the clumps of trees scattered about in pastures and coffee-plantations.

## 22. *Columba albilinea crissalis* Salvadori.

*Chlorænas albilinea* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 135 (Rancho Redondo [F. Carmiol], San Juan [Zeledón]). — CABANIS, Jour. für Orn., 1869, 211 (C. R.). — FRANTZIUS, Jour. für Orn., 1869, 370 (El Mojón and San Juan.)

*Columba albilinea* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (San José and Alajuela). — CHERRIE, Auk, 1892, 328 (San José, rare; common at high altitude on Irazú).

*Columba albilineata* BOUCARD, Proc. Zool. Soc. Lond., 1878, 43 (Desamparados). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 498 (Cot, Irazú).

*Columba crissalis* SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 294 (Rancho Redondo [J. Carmiol], Volcan de Cartago [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 238 (La Carpintera, El Berilla, El Salitrillo, Tres Rios, Azahar de Cartago, Estrella de Cartago, Cedral de Candelaria, Carrillo [Underwood]).

*Columba albilinea crissalis* BANGS, Proc. New. Eng. Zool. Club, III, 23 (Chiriquí).

U. S. Nat. Museum : Volcan de Turrialba (Ridgway & Zeledón), Santa Maria de Dota (Basulto), La Carpintera.

Bangs Collection : La Estrella de Cartago and Escazú (Underwood).

C. H. Lankester Collection : Volcan de Póas.

Fleming Collection : Slopes of Irazú (Underwood).

Carnegie Museum: Ujurrás de Térraba, Miravalles, Bagáces (Carriker). Five skins.

Upon comparing Costa Rican with South American specimens of *C. albilinea*, it is at once evident that the northern bird is not entitled to specific rank, for the differences are not such as could be used for separating it specifically.

As a general rule this handsome bird is to be found only at quite high altitudes, where it breeds, being induced to descend in search of food only at certain times of the year. In April I noticed it in considerable numbers on the Volcan de Irazú above timber-line. Mr. Lankester noted it in abundance on Póas, while in September they were numerous on the high ridges of the Talamanca Cordillera above Ujurrás (about 7,000 feet), feeding upon the acorns which were just beginning to fall. Their flesh was so bitter from this cause that they could not be eaten.

### 23. *Columba nigrirostris brunneicauda* n. subsp.

*Columba nigrirostris* SCLATER, Proc. Zool. Soc. Lond., 1859, 390 (Oaxaca, Mexico). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Talamanca). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 322 (Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 239 (Rio Matina, Naránjo de Cartago, Trojas, Reventazón, Pózo Pital, Sipúrio, Sarchi de Grecia, Juan Viñas, Guayabal [Underwood]). — BANGS, Auk, XXIV, 1907, 292 (Boruca, El Pózo and Paso Real de Térraba [Underwood]).

*Chlorænas nigrirostris* FRANTZIUS, Jour. für Orn., 1869, 371 (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 135 (Costa Rica [Arcé]; Coll. of O. Salvin).

U. S. Nat. Museum: Guayábo (Ridgway & Zeledón), Bonilla (Ridgway) (Basulto), Pígres (Zeledón).

Bangs Collection: Pózo Azul, El General de Térraba (Underwood).

C. H. Lankester Collection: Ciruélas, Turrúcares.

Carnegie Museum: Pózo Azul, Guápiles, Boruca, El Hogar (Carriker). Four skins.

Type, adult ♂, Guápiles, March 3, 1903, collected by M. A. Carriker, Jr., and J. C. Crawford. Collection Carnegie Museum, No. 13,185.

Differs from *C. nigrirostris nigrirostris* in its smaller size, deeper vinaceous tint of under parts, in having a brown tail, and in having the under tail-coverts concolorous with the abdomen.

True *nigrirostris* from British Honduras has the tail decidedly sooty-grayish, while the coverts are bluish-slate, tipped with bluish-vinaceous.

In Costa Rican birds there is only a slight amount of bluish at the base of the feathers, or none. The Costa Rican birds have the basal two-thirds of the inner web of three outer rectrices bright russet-brown, while in true *nigrirostris* there is only a trace of brown. The new form has the upper parts paler and more olive-brown and the pileum brighter with no trace of purplish.

Measurements of *C. nigrirostris nigrirostris*: Male, wing, 161; tail, 129.

Measurements of *C. nigrirostris brunneicauda*: Male, wing 155; tail, 123.

Confined entirely to the lower portions of the country, on both coasts, seldom going above 2,000 feet and more abundant at about 1,000 feet or lower. Like all members of the genus they keep pretty well to the tree-tops, more open woodland, and fringes of trees along streams.

#### 24. *Columba subvinacea* (Lawrence).

*Chlorænas subvinacea* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 135 (Dota, Feb. 26, 1867 [F. Carmiol]). — SALVIN, Ibis, 1869, 317 (crit.). — FRANTZIUS, Jour. für Orn., 1869, 317 (San Antonio).

*Columba subvinacea* BOUCARD, Proc. Zool. Soc. Lond., 1878, 43 (Candelaria). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Las Trojas and Naránjo de Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 53 (Lagarto); Expl. Zool. Rio Naránjo, 1893, 7 (Pózo del Pital). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 326 (Barranca [J. Carmiol], San José [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 239 (Azahar de Cartago and Sarchí de Grecia [Underwood]).

U. S. National Museum: Guayábo (Ridgway & Zeledón), Coliblanco (Ridgway), Bonilla (Basulto), Las Trojas (Alfaro), Turrialba (J. Cooper).

Bangs Collection: Sarchí, La Estrella de Cartago, Azahar de Cartago (Underwood).

C. H. Lankester Collection: Guácimo.

Fleming Collection: Cachí (Underwood).

Carnegie Museum: Ujurás de Térraba (Carriker). One skin.

Habits and range nearly the same as those of the preceding species, although the present form is often taken at higher altitudes.

#### 25. *Zenaidura carolinensis* (Linnæus).

*Zenaidura carolinensis* LAWRENCE, Ann. Lyc. N. Y., IX, 139 (Volcan Irazú [Cooper], San José [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 372 (San José). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 43 (San José, Jan. to



May). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 374 (San José [Cal-leja and J. Carmiol]). — UNDERWOOD, Ibis, 1896, 447 (Miravalles to Bebe-déro). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 242 (Ala-juéla, San Lucas, Azahar de Cartago, Bebedéro, Miravalles [Underwood]).

*Zenaidura macroura* ZELEDÓN, An. Mus. Nac. de Costa Rica, I, 1887, 128 (San Mateo and Faldas de Irazú). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 53 (Buenos Aires); Auk, IX, 1892, 329 (San José, seems to be resi-dent as birds are taken every month in the year; no knowledge of breeding).

Bangs Collection: Escazú, March 13 (Underwood).

C. H. Lankester Collection: Miravalles and El Hogar.

Carnegie Museum: La Hondura (Carriker). One skin.

The Carolina Dove is quite abundant during the winter months in some localities, but few are ever seen on the Caribbean lowlands. They much prefer the dryer portion of the plateau district and the western slope, where they are quite common. Mr. Cherrie states that the bird is probably resident at San José, but knows nothing of their breeding there. While it is true that a few birds do remain through the summer, I have no doubt that it is due to the same causes which influence some of the shore-birds to remain during the same season, namely, inability to make the long flight necessary for the return trip north, through injury or sickness at the time that the bulk of the birds leave, or through some sexual derangement whereby they do not feel the breeding instinct which impels the northern visitors to return to their breeding haunts.

## 26. *Melopelia asiatica* (Linnæus).

*Melopelia leucoptera* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 139 (San José [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 372 (Costa Rica). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 408 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (San Mateo). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 392 (C. R. [J. Carmiol]). — UNDERWOOD, Ibis, 1896, 447 (Miravalles, common, in flocks). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, III, 1902, 245 (San Lucas, Bebedéro, Bagáces, Miravalles [Underwood]).

U. S. Nat. Museum: Santo Domingo de San Mateo (Ridgway).

Bangs Collection: Polson, Dec. 18, Tenorio, Feb. 3-13, Cerro de Santa Maria, Jan. 9, Miravalles, Nov. 25, Pózo Azul de Pirrís, Feb. 16 (Underwood).

C. H. Lankester Collection: Guanacaste and Turrúcares.

Carnegie Museum: Bebedéro, May 1, Miravalles, May 17, 1906 (Carriker). Two skins.

Confined almost entirely to the Pacific coast region, Nicoya, and Guanacaste, coming up upon the central plateau in small numbers, where it is sometimes taken in the vicinity of San José. It is particularly fond of the "sabanas" and sparsely wooded district of Guanacaste, where it is often met with in considerable numbers.

27. *Chæmepelia passerina neglecta* n. subsp.

- Chæmepelia passerina* LAWRENCE, Ann. Lyc. N. Y., IX, 1869, 139 (San José [J. Carmiol], Cartago [J. Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 371 (Costa Rica). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 43 (near San José). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 502 (Irazú [Nutting]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 408 (La Palma de Nicoya). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893 (San José [J. Carmiol], Irazú [Rogers]). — UNDERWOOD, Ibis, 1896, 447 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 250 (Bebedéro and Alajuela [Underwood]).
- Columbigallina passerina* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (San José). — CHERRIE, Auk, VII, 1890, 333 (San José; common resident, breeds); IX, 1892, 329 (San José, common).
- Columbigallina passerina pallescens* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 523 (San Carlos).

U. S. Nat. Museum: Alajuela (Alfaro), San José (Underwood).

Acad. Nat. Sci. Philadelphia: Bagaces and Bebedéro (Underwood).

C. H. Lankester Collection: Cachí.

Bangs Collection: Tenorio, Coralillo, San José, Los Cuádras de Irazú (Underwood).

Carnegie Museum: San José, Miravalles, Esparta (Carriker). Five skins.

Type, adult ♂, Esparta, June 5, 1907, M. A. Carriker, Jr., Collector; Collection Carnegie Museum, No. 28,274.

Nearest to *C. passerina granatina* and *pallescens*.

The male differs from *pallescens* in being darker above, decidedly brownish on back, scapulars, and rump, while the wings and lower parts are much lighter vinaceous. In *pallescens* the under tail-coverts are decidedly grayish, edged with grayish-white, whereas in the new form they are quite brownish, edged with grayish-vinaceous. It is distinguished from *granatina* in being much deeper vinaceous below, especially on the flanks and abdomen, which are concolorous with, or darker than, the breast, while *granatina* has the same parts much paler, the center of the abdomen being white, with the under tail-coverts pale gray, broadly edged with white, almost concealing the gray centers of the feathers; the wing is much ruddier, that of *granatina* being pale gray on the outer secondaries and coverts.

The female differs very decidedly from that of *pallescens* in being very dusky below, almost buffy-drab with a slight vinaceous tint while the former is decidedly grayish below without buffy or vinaceous; the wings and upper parts are also much darker. *C. p. granatina* (female) is entirely grayish-white below, with the wings very pale.

Abundant over the entire plateau region and northern portion of the Pacific slope and lowlands, extending rarely into the Caribbean plain. In the Térraba region it seems to be supplanted by the two following species of the genus.

### 28. *Chæmepelia minuta* (Linnæus).

*Columba minuta* LINNÆUS, Syst. Nat., I, 1766, 285.

*Chæmepelia minuta* BANGS, Auk, XXIV, 1907, 292 (Paso Real de Térraba, July [Underwood]).

Carnegie Museum: Buenos Aires de Térraba. Five specimens (Carriker).

As far as known at the present time the only locality occupied by this little dove is the upper portion of the Térraba Valley, chiefly on the "sabanas" surrounding Buenos Aires, where it is fairly abundant. Its presence here is very unusual, since it is apparently an isolated colony. It seems to be abundant from British Honduras to southern Mexico and is again found sparingly in Panama, but has never been recorded in any other part of Costa Rica, Nicaragua, or Chiriquí.

Its habits are essentially the same as those of the other species of the genus, and at Buenos Aires it is found in company with *C. rufipennis rufipennis*.

### 29. *Chæmepelia rufipennis rufipennis* (Bonaparte).

*Talpacotia rufipennis* BONAPARTE Consp. Avium, II, 1854, 79.

*Chamæpelia rufipennis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 139 (San José [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 372 (Orósi). — Boucard, Proc. Zool. Soc. Lond., 1878, 43 (Puntarenas, May). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 487 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 253 (Costa Rican references). *Columbigallina rufipennis* ZELEDÓN, An. Mus. Nac. de Costa Rica, I, 1887, 127 (Las Trojas). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 53 (Térraba Valley).

*Chamæpelia talpacoti rufipennis* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 408 (La Palma de Nicoya).

*Chæmepelia rufipennis rufipennis* BANGS, Auk, XXIV, 1907, 292 (Boruca, El Pózo, and Barranca de Térraba [Underwood]).

U. S. Nat. Museum : Pígres (Ridgway), Puntarenas.

C. H. Lankester Collection : Cachí.

Carnegie Museum : Miravalles, El Pózo, Boruca (Carriker). Five skins.

Much less common in Costa Rica than *C. passerina neglecta*, and seems to be confined chiefly to the lowlands of the Pacific, around the Gulf of Nicoya and in the Térraba Valley, being abundant in the latter region. There are few records of its occurrence in the interior, although Boucard took it at Orósi and Lankester at Cachí, localities near to each other at an altitude of about 2,500 feet in the valley of the Rio Reventazón.

It was very common at all points visited in the Térraba region (except Ujurrás) frequenting the grass-grown shores of the Rio Grande in company with *Claravis pretiosa*, and it was a common sight to see small flocks of them about the houses in Boruca and Buenos Aires. Their food seems to consist chiefly of the seeds of grass and weeds.

### 30. *Claravis pretiosa pretiosa* (Ferrari-Perez).

*Peristera pretiosa* FERRARI-PEREZ, Proc. U. S. Nat. Mus., IX, 1886, 175 (Jalapa, Mexico; crit.).

*Peristera cinerea* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 138 (Gulf of Nicoya; coll. of O. Salvin). — FRANTZIUS, Jour. für Orn., 1869, 371 (Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Las Trojas, Alajuéla, San José, Naránjo de Cartago). — CHERRIE, Auk, IX, 1892, 329 (San José, tolerably common resident). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 491 (La Barranca [Arcé], Costa Rica [J. Carmiol]). — UNDERWOOD, Ibis, 1896, 447 (Miravalles; few seen). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 255 (Miravalles, Laguna de Cartago, Talamanca, Tres Rios, Turrialba [Underwood]).

*Claravis pretiosa* OBERHOLSER, Pr. Acad. Nat. Sci. Phila., 1899, 203 (crit.).

*Claravis pretiosa pretiosa* BANGS, Auk, XXIV, 1907, 292 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum : Bonilla (Ridgway) (Basulto), Pígres (Ridgway & Zeledón), San Sebastian de San José, Laguna de Cartago; Talamanca (Cherrie), San José and Alajuéla (Alfaro).

Fleming Collection : La Estrella de Cartago (Underwood).

Bangs Collection : Pózo Azul de Pirris (Underwood).

Carnegie Museum : San José, Guápiles, El Hogar, El Pózo de Térraba (Carriker). Thirteen skins.

A series of Costa Rican birds differ among themselves in the number and size of the black spots on the wings, some being very heavily

spotted, while others have scarcely any spots. They do not differ appreciably from specimens from British Honduras. A young male from the latter locality shows an interesting phase of plumage, having the upper parts as in the adult female, with a blue feather appearing here and there on the shoulders, while the lower parts and under wing-coverts are entirely blue as in the adult male.

One of the most abundant of the Costa Rican pigeons, ranging over the lowlands of both coasts and over the entire central plateau district, but being more abundant in the interior and on the Pacific lowlands, especially in the southern part. They are almost, if not entirely, terrestrial in their habits, alighting in trees only when alarmed or roosting. They are fond of the river-banks and abandoned fields where the seeds of weeds and grasses abound.

### 31. *Claravis mondetoura* (Bonaparte).

*Peristera mondetoura* BONAPARTE, *Compte Rend.*, XLII, 1856, 765. — LAWRENCE, *Ann. Lyc. N. Y.*, IX, 1868, 139 (Birris [Zeledón]). — FRANTZIUS, *Jour. für Orn.*, 1869, 371 (Birris). — ZELEDÓN, *An. Mus. Nac. de C. R.*, I, 1887 (Cot de Cartago). — SALVADORI, *Cat. Birds Brit. Mus.*, XXI, 1893, 495 (Central America). — SALVIN and GODMAN, *Biol. Centr.-Am., Aves*, III, 1902, 256 (Irazú [Underwood]).

*Claravis mondetoura* OBERHOLSER, *Proc. Ac. Nat. Sci. Phila.*, 1899, 233 (crit.).

Bangs Collection: Cartago (1♂), La Estrella de Cartago (1♀) (Underwood).

Carnegie Museum: Volcan de Irazú (Carriker). One male.

One of the rarest of the doves, and found only at the higher altitudes in the forest, where it apparently always keeps on, or near, the ground. The specimen taken on the Volcan de Irazú was secured in the dense forest at an elevation of about 8,000 feet. Another was seen on the Volcan de Turrialba, in October, 1907, in an extremely dense piece of woodland just below timberline.

### 32. *Leptotila verreauxi* Bonaparte.

*Leptotila verreauxi* BONAPARTE, *Conspec. Av.*, II, 1854, 73 (New Granada). — LAWRENCE, *Ann. Lyc. N. Y.*, IX, 1868, 137 (San José and Barránca [J. Carmiol], Dota [F. Carmiol]). — FRANTZIUS, *Jour. für Orn.*, 1869, 371 (Costa Rica). — BOUCARD, *Proc. Zool. Soc. Lond.*, 1878, 43 (San José). — SALVADORI, *Cat. Birds Brit. Mus.*, XXI, 1893, 548 (San José [J. Carmiol]). — UNDERWOOD, *Ibis*, 1896, 447 (Miravalles). — SALVIN and GODMAN, *Biol. Centr.-Am., Aves*, III, 1902, 260 (Bellavista, Alajuéla, San Lucas and Bebedéro [Underwood]). — BANGS, *Auk*, XXIV, 1907, 292 (Boruca, Paso Real, and El Pózo de Terraba [Underwood]).

*Leptoptila riottei* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 137 (Navarro [J. COOPER]). — FRANTZIUS, Journ. für Orn., 1869, 371.

*Engyptila verreauxi* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 408 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 502 (Irazú [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Las Trojas, San Mateo, San José, and Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 53 (Lagarto); Expl. Zool. Rio Naránjo, 1893, 7 (El Pózo del Pital); Auk, IX, 1892, 329 (San José, tolerably common).

U. S. Nat. Museum: Pígres (Ridgway).

American Mus. Nat. History: San José (Underwood).

Acad. of Nat. Sci. Philadelphia: Bebedéro (Underwood).

Bangs Collection: Pózo Azul, Bolson, San José (Underwood).

Carnegie Museum: Bebedéro, Miravalles, San Mateo, El Pózo de Térraba, Boruca, Buenos Aires (Carriker). Eight skins.

Found only on the Pacific slope of the plateau region, from San José westward, more abundantly at lower altitudes. Abundant all over Nicoya and Guanacaste up to Nicaragua and in the Térraba Valley. I found it quite common at Buenos Aires. It is very fond of running along roads and paths, especially where they pass through woodland. Like all the species of the genus it keeps near the ground and is fond of thickets and second-growth woodland.

### 33. *Leptotila plumbeiceps* Sclater and Salvin.

*Leptotila plumbeiceps* SCLATER and SALVIN, P. Z. S., 1868, 59 (Vera Paz in Guatemala and Mexico). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 29 (Bolson, Dec. 18-23, 1907 [Underwood]).

It is rather remarkable that this pigeon should be found in Costa Rica, having never been recorded south of Guatemala and Honduras. The specimens are typical *plumbeiceps*, agreeing with birds from Mexico. There are two males collected by C. F. Underwood at Bolson, on the Tempisque River, December 18 and 23, 1907.

### 34. *Leptotila cassini vinaceiventris* (Ridgway).

*Engyptila vinaceiventris* RIDGWAY, Pr. U. S. Nat. Mus., X, 1887, 583 (Truxillo, Honduras [Townsend]).

*Leptotila cassini* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 137 (San José [J. Carmiol], Tucurrique [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 371 (Tucurrique). — BOUCARD, P. Z. S., 1878, 43 (San Carlos). — SALVADORI, Cat. Birds Brit. Mus., XXI, 560 (Costa Rica). — UNDERWOOD, Ibis, 1896, 447 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 262 (Cartago and Carrillo [Underwood]).

*Leptotila cassini vinaceiventris* BANGS, Proc. Biol. Soc. Wash., XIX, 102 (Miravalles and Juan Viñas [Underwood]).

U. S. Nat. Museum: Bonilla (Ridgway), Jiménez (Alfaro).

Bangs Collection: Tenorio, La Vijagua, Cachí, Cerro de Santa Maria (Underwood).

Fleming Collection: Cariblanco (Underwood).

Carnegie Museum: Guápiles, El Hogar, Cuábres, and Rio Sicsola (Carriker). Nine skins.

Upon comparison of a good series of birds from Panama (true *L. cassini*) with those from Honduras (*L. vinaceiventris*), it becomes evident at once that the northern bird is no more than a race of *cassini*. All Costa Rican birds examined proved to be referable to the northern form, some being not quite typical, while others could not be distinguished from birds from Honduras.

Confined almost entirely to the Caribbean lowlands, from sea-level up to about 3,000 feet, although some stragglers go higher. It is most abundant, however, between 500 and 1,500 feet. It is also occasionally to be met with on the Pacific slope in northern Guanacaste, evidently crossing from one side to the other along the southern shores of Lake Nicaragua. The habits of this species differ slightly from other Costa Rican species of the genus, this bird, after the manner of *Geotrygon*, keeping more to the thick forest, feeding on the ground, and, when flushed, alighting in low trees and shrubbery.

### 35. *Leptotila rufinucha* Sclater and Salvin.

*Leptotila rufinucha* SCLATER and SALVIN, Nomencl. Av. Neotrop., 1873, 133 and 162 (Veragua). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 562 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 264 (Pacific lowlands, Pózo Pital, Tambor, Pirris [Underwood *in litt.*]). — BANGS, Auk, 1907, 292 (Boruca and El Pózo [Underwood]).

*Engyptila rufinucha*, ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Pózo Azul). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 53 (Palmár, Boruca, Lagarto, and Buenos Aires).

U. S. Nat. Museum: Trojas (Alfaro), Pígres (Zeledón).

Bangs Collection: El General de Térraba (Underwood).

Carnegie Museum: El Pózo, Boruca, and Buenos Aires (Carriker). Eight skins.

Ranges over the southwestern part of the country, coming up from Panama, and is most abundant in the Térraba Valley. It has been taken more rarely upon the Pacific coastal plain as far as the head of the Gulf of Nicoya. Zeledón records a specimen from Alajuela which must have been a straggler, while I think there can be no doubt

that the record for La Candelaria by Underwood (*Biologia*) is a mistake, and should refer either to *verreauxi* or *cassini vinaceiventris*.

It is one of the most abundant pigeons in the Térraba Valley, living under the same conditions as *L. verreauxi*, with which it is frequently associated in the same locality. The birds of this genus are not gregarious, only being met with singly or in pairs.

### 36. *Geotrygon violacea albiventer* Lawrence.

*Geotrygon violacea* SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 565, *part.* (Central America). — UNDERWOOD, *Ibis*, 1896, 447.

*Geotrygon albiventer* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 135 (Angostura [Carmioli]).

Bangs Collection: Tenorio and Miravalles, three specimens (Underwood).

It is impossible to tell exactly what part of Costa Rica the range of this bird covers, there being but three records of its occurrence. The first known record is that of Lawrence, under *G. albiventer*, and not the specimens taken by Underwood at Miravalles, as stated by Salvin in a note under that species in Underwood's List. It would seem that the bird is practically confined to northwestern Costa Rica in the region of the volcanoes Miravalles and Tenorio, where, according to Underwood, it is not so extremely rare. The only other record is from Angostura, in the valley of the Rio Reventazón at about 2,000 feet. Its habits are evidently similar to those of *G. montana*.

I have seen but one slightly immature bird of *G. violacea*, from South America, and consequently could make no close comparison of that species with the one from Central America, but the close resemblance of that one skin to Costa Rican birds, combined with the statement made by Messrs. Salvin and Godman (*Biologia*) that the Central American bird is separated from the Brazilian only on the character of its more vinous forehead and cheeks and by the more intense violet-blue on the mantle, lead me to the conclusion that the Central American bird should be made a subspecies of the Brazilian, as given above.

### 37. *Geotrygon montana* (Linnæus).

*Columba montana* LINNÆUS, Syst. Nat., I, 1766, 131.

*Geotrygon montana* GOSSE, Birds of Jamaica, 320. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 135 (Angostura [J. & F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 371 (Orósi). — BOUCARD, P. Z. S., 1878, 43 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Angostura and Birris de



Cartago). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 567. — UNDERWOOD, Ibis, 1896, 447 (Miravalles). — BANGS, Auk, 1907, 292 (Boruca and El Pózo [Underwood]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 265 (Sabanilla de Pirris [Underwood *in litt.*]).

Bangs Collection: Pózo Azul, Buenos Aires, Tenorio, El General and Cerro de Santa Maria (Underwood).

Carnegie Museum: El Pózo de Térraba and Boruca (Carriker). Two females.

There seems to be no appreciable difference between birds from Costa Rica, Colombia, and British Honduras. The range of this species covers the whole of the central highlands (not above 4,000 feet) and the entire Pacific coast belt down to a point near sea-level, wherever there are dense primeval forests. I have never seen it, nor are there any records for it, on the Caribbean lowlands, that is below 2,000 feet. The lowest point seems to be Angostura on the Reventazón River.

It inhabits only the dense forest, keeping on or near the ground, and when alighting above the earth always chooses a low limb or vine. They are often to be seen walking about on the ground like partridges. I found a nest at El Pózo late in June, which contained one young bird, nearly fledged. The nest was a rude platform of twigs and leaves, placed in a small palm in the thick forest, two feet from the ground. The female left the nest on my approach, fluttering along the ground with dragging wings, acting to perfection the part of a crippled bird, in order to lure me away from her nest.

### 38. *Geotrygon veraguensis* Lawrence.

*Geotrygon veraguensis* LAWRENCE, Ann. Lyc. N. Y., VIII, 349 (Veragua [J. K. Merritt]). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 575 (Panama and Veragua). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 267.

*Geotrygon rufiventris* LAWRENCE, Ann. Lyc. N. Y., XI, 1874, 90 (Talamanca [Cooper-Gabb Exped.]).

Bangs Collection: Reventazón, 1 ♂ (Underwood).

Carnegie Museum: Cuábre ♂, and El Hogar ♂ & ♀ (Carriker).

Lawrence's type of this species was undoubtedly a female, as stated by Salvin and Godman (Biologia), although there is little difference between the sexes, except in the color of the forehead and cheeks. A male from Talamanca (Cuábra) is exactly the same as a male from northeastern Costa Rica (El Hogar).

The range of the present species covers the coastal plain of the Caribbean from Panama to Nicaragua, but it is probably never found above 800 or 1,000 feet. In Talamanca, as well as at El Hogar, other birds were seen besides the ones secured, and always on the ground in the thick, dark forest in some wet spot, either along the edges of a small sluggish creek or about a boggy spring. It would seem that they feed upon small slugs and larvæ which are found in wet places. When flushed they will fly for fifty or a hundred feet and again alight on the ground. Two pairs were seen at El Hogar besides the ones secured.

### 39. *Geotrygon lawrencei* Salvin.

*Geotrygon veraguensis* SALVIN (nec Lawr.), P. Z. S., 1867, 159 (Santiago de Veraguas).

*Geotrygon lawrencii* SALVIN, Ibis, 1874, 329 (Veragua). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 576 (Veragua). — SALVIN and GODMAN, Biologia Centr.-Am., Aves, III, 1902, 266 (Panama). — CARRIKER, Ann. Carnegie Museum, Vol. IV, 1908, 302 (Carrillo).

Bangs Collection: Cariblanco, Aug., 1899, and Tenorio, Jan., 1908 (Underwood).

Carnegie Museum: Carrillo, Aug. 20, 1905, ♂ (Carriker).

This is perhaps one of the rarest of the Costa Rican pigeons, but is also very rare throughout the whole of its range. The four birds recorded above are the only ones I know of having been taken in the country. Its habits are apparently similar to those of *G. costaricensis*, to which it is most nearly related.

### 40. *Geotrygon costaricensis* Lawrence.

*Geotrygon costaricensis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 136 (Frantzius). — FRANTZIUS, Jour. für Orn., 1869, 371 (Las Cruces de Candelaria). — BOUCARD, P. Z. S., 1878, 43 (La Candelaria). — NUTTING, Proc. U. S. Nat. Mus., V, 1882 (Irazú). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 502 (San José (?)). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Rancho Redondo). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 577 (Candelaria). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 267 (Azahar de Cartago, Estrella de Cartago, Turrialba, Carrillo [Underwood in litt.]).

U. S. Nat. Museum: Burgos (Castro), La Estrella and Volcan de Turrialba.

Bangs Collection: Cachí, Irazú, Escazú (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Cordillera de Talamanca (7,000 feet) (Carriker).

One male.

Messrs. Salvin and Godman (Biologia) say that "The true *G. lawrencei* is replaced in Costa Rica by this species." From lack of material they have failed to observe the great differences between the two birds. With adult males of both species before me the differences are so apparent that no confusion should arise. *G. lawrencei* has a white forehead, dark grass-green nape, deep violet-purple mantle, with the back and wings deep olive-brown or sepia. *G. costaricensis* has a cinnamon-buff forehead, lighter and more metallic-green nape, mantle more vinous-purple and the back and wings rich purplish-chestnut. In *lawrencei* the slaty-blue of the under parts extends to the belly, while in *costaricensis* it covers only the upper half of the breast.

This is a bird exclusively of the forest and is rarely found at low altitudes, being confined to the plateau region and the high mountains. Like all the species of the genus it keeps close to the ground.

#### 41. *Geotrygon chiriquensis* Sclater.

*Geotrygon chiriquensis* SCLATER, P. Z. S., 1856, 143 (Chiriquí, Panama). — SCLATER and SALVIN, Exotic Orn., 1867, Plate LXII. — BOUCARD, P. Z. S., 1878, 43 (Irazú and La Candelaria). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (La Candelaria, El Zarcero de Alajuela). — SALVADORI, Cat. Birds Brit. Mus., XXI, 1893, 579 (Veragua and Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 270 (Tarrazú [Underwood *in litt.*]).

*Geotrygon cæruleiceps* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 137 (Cervantes [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 371 (Cervantes).

Bangs Collection: La Estrella, Cerro de Santa Maria (Underwood).  
Carnegie Museum: Ujurrás de Térraba (Carriker). Four skins.

An adult male and female are exactly alike with the exception that the male is a little larger and has the violet-purple of the mantle deeper and brighter and extending further backward. Of two immature males, one agrees with Mr. Salvadori's description (Cat. Birds Brit. Mus.) of the immature, the other (a little older) has attained the plumage of the adult on the head and lower parts, but still has some of the secondaries and tertials as well as lesser wing-coverts and scapulars with black subterminal bars.

Found sparingly over the higher portions of the plateau region and the higher mountains, wherever virgin forest still persists in any quantity. I found them fairly abundant in the heavy forest near the continental divide at the headwaters of the Rio Ceibo, a tributary of the

Rio General de Térraba. They are partial to the deep dark ravines, where they feed on the ground, alighting on low limbs when flushed. Two nests were found on September 16, 1907. They were both placed on the ends of slender trees hanging over the sides of a deep ravine, and in such inaccessible places that the eggs were broken in attempting to secure them. They were apparently fresh and of a deep cream-color.

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42. *Aramides axillaris* Lawrence.

*Aramides axillaris* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1863, 107 (Baranquilla, Colombia). — SHARPE, Cat. Birds Brit. Mus., XXIII, 1894 (no Costa Rican records). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 318 (no Costa Rican records). — BANGS, Am. Nat., 1907, 483 (one specimen from Costa Rica [Underwood]).

The single specimen recorded by Mr. Bangs from Costa Rica is an immature bird collected by Underwood, probably at Carrillo, and cannot be confused with any other species, since the immature plumage of this bird is very different from any other occurring in Costa Rica, and furthermore it agrees with young birds from Mexico. Since the above record was published I am informed that a slightly immature male of this species was taken by C. F. Underwood at Lepanto, March 16, 1909.

It is not at all strange that this bird should be found in the region in question, the fact that it occurs north and south of it making it more than probable that it should be found in Costa Rica. Why it should be so rare is a mystery.

43. *Aramides cajanea* (Müller).

*Fulica cajanea*, P. L. S. MÜLLER, Syst. Nat. Suppl., 1776, 119.

*Aramides cayennensis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 143 (Santa Ana [Zeledón]). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 528 (Pacific slope [Alfaro], Talamanca [Gabb]). — CHERRIE, Expl. Zool. en C. R., 1881-2, 1893, 53 (Boruca and Buenos Aires).

*Aramides plumbeicollis* UNDERWOOD, Ibis, 1896, 450 (Miravalles).

*Aramides cajanea*, SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 57 (no C. R. reference).

*Aramides cajanea* BANGS, Am. Nat., XLI, 483 (Talamanca District and Pózo Azul); Auk, 1907, 291 (Boruca [Underwood]).

*Aramides chiricote* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 318 (Costa Rica).

Bangs Collection: El General de Térraba (Underwood).

Carnegie Museum: Pózo Azul, Buenos Aires, Rio Sicsola (Carriker);  
Pózo Azul (Underwood). Four skins.

This species seems to range over the lowlands both of the Caribbean and Pacific up to perhaps 1,500 feet. It never leaves the forest, preferring wet or boggy spots or the banks of creeks. It is very shy, running swiftly away at the slightest disturbance, and to secure them the greatest caution must be used in walking through the forest. They will usually run a few feet when first seeing anyone, then stop or walk slowly for a few seconds before running swiftly, and at that moment must be secured, for they will not be seen again.

44. **Aramides albiventris plumbeicollis** (Zeledón).

*Aramides plumbeicollis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131; II, 1888, 3 (Jiménez [Alfaro]). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 528 (Jiménez). — SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, Note, p. 53. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 320 (Carrillo [Underwood]).

*Aramides cayennensis* FRANTZIUS, Jour. für Orn., 1869, 375.

*Aramides albiventris plumbeicollis* BANGS, Am. Nat., XLI, 1907, 483 (Jiménez, Carrillo, Cariblanco [Underwood]).

Carnegie Museum: El Hogar, Guápiles, Vol. Turrialba (2,000 feet) (Carriker). Three skins.

Confined entirely to the Caribbean lowlands, and probably only in the northeastern part, since there are no records of its presence in southeastern Costa Rica, and all specimens recorded from Talamanca belong to the preceding species, *A. cajanea*.

Its habitat and habits are the same as for the preceding.

45. **Porzana carolina** (Linnæus).

*Rallus carolinus* LINNÆUS, Syst. Nat., I, 366, 1766.

*Porzana carolina* SCLATER and SALVIN, Ibis, 1859, 230. — CHERRIE, Auk, 1890, 332; 1892, 329 (San José, 1881 [Zeledón]). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, III, 1903 (Laguna de Cartago [Underwood *in litt.*]).

*Crex carolina* FRANTZIUS, Jour. für Orn., 1869, 375 (Costa Rica).

Bangs Collection: San José, Alajuela, San Pedro (Underwood).

C. H. Lankester Collection: Turrúcares.

It is surprising that there are so few records of the taking of this rail in Costa Rica, because it becomes quite common during the winter at many places. I saw numerous birds in the vicinity of Guápiles and Jiménez during the winter of 1906, and in October, 1907, they were abundant at Turrúcares, being hunted as game-birds by some of the

foreigners at San José. They prefer wet grassy tracts of the rice-fields, most of the birds at Turrúcares being seen in the latter places.

#### 46. *Creciscus albigularis* (Lawrence).

*Corethura albigularis* LAWRENCE, Ann. Lyc. N. Y., VII, 1861, 302 (Panama).

*Porzana albigularis* SCLATER and SALVIN, Exotic Orn., 1868, 109 (Barránca, Costa Rica, one specimen [Arcé]).

*Creciscus albigularis* SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 140 (from Colombia to Costa Rica and Nicaragua). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 324.

*Porzana alfari* RIDGWAY, Proc. U. S. Nat. Mus., X, 1887, 111 (Las Trojas [Alfaro]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131.

*Creciscus alfara* SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 141, note.

Mr. Bangs, while recently in Washington, carefully examined the type of *Porzana alfari*, and informs me that it is a slightly immature specimen of *C. albigularis* and not of *C. cinereiceps* as placed by Mr. Richmond in his synonymy of that species (Auk, XII, 1895, 19). In addition to this specimen we have the bird taken at Barránca by Arcé, cited in "Exotic Ornithology." There are no records for *C. cinereiceps* from the Pacific coast, probably only this species occurring there in very small numbers.

#### 47. *Creciscus cinereiceps* (Lawrence).

*Porzana cinereiceps* LAWRENCE, Ann. Lyc. Nat. Hist. N. Y., XI, 1875, 90 (Talamanca [Gabb]). — RICHMOND, Proc. U. S. Nat. Museum, XVI, 1893, 528 (Rio Frio). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131 (Pacuaire).

*Creciscus cinereiceps* SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 141, note and p. 337. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 325 (Pacuarito, Desamparados, Jiménez, Reventazón, Sipurio, Juan Viñas, Azahar de Cartago, Carrillo [Underwood *in litt.*]).

*Creciscus albigularis* SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 140, *part.* — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 324, *part.* (Las Trojas [Alfaro]).

*Porzana albigularis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131. — SCLATER and SALVIN, Exotic Orn., 1868, 109 (Barránca [Arcé]).

U. S. Nat. Museum: Juan Viñas (Underwood), Reventazón (Carranza).

Bangs Collection: Carrillo, Cariblanco, Juan Viñas (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles, Juan Viñas, Bonilla, Carrillo (Carriker).

Four skins.

Little remains to be said regarding the status, habits, and nesting of this bird, which can add to the knowledge of it already given by Dr. Richmond in his excellent paper (*Auk*, XII, 1895, 19). Its Costa Rican range covers the whole of the Caribbean lowlands and up to a considerable altitude on the eastern slope, probably as far as Cartago, but for the Pacific Coast I can find no records. The reason for its absence on the Pacific is probably due to the dry season, which lasts there for six months, and is evidently very hard on such a moisture-loving bird.

I found it very common throughout the Santa Clara Valley, inhabiting the pastures of para- and guinea-grass. In fact in any spot where para-grass was to be found the rail was always present, along the railroads, the banks of streams, etc. They begin breeding around Guápiles about the first of May, and continue for some time. Nearly fresh eggs were found as late as July 13. In this locality the nests were almost invariably made of the dried leaves of a very wide-bladed grass locally known as "Cola gallo" (rooster tail), were globular in shape, with the entrance at one side and were usually placed in a clump of grass about one or two feet from the ground. Four eggs were the usual number laid. They are pale creamy-white, dotted and speckled with shell-markings of lilac, overlaid by reddish-chestnut scattered sparsely over the entire surface. Measurements: average,  $30 \times 22$  mm.

#### 48. *Gallinula galeata* Bonaparte.

*Gallinula galeata* BONAPARTE, Amer. Orn., IV, 1832, p. 128, Pl. XXXVII, fig. 1.—SALVIN, *Ibis*, 1870, 115 (Costa Rica [J. Carmiol]).—SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 177 (Costa Rica [J. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 326.

There seem to be no other records of the taking of this species in Costa Rica except that of the single male collected by Carmiol and recorded first by Salvin (*Ibis*, 1870, 115). I can find no Costa Rican specimens in the museums of this country, nor did I see the bird during my stay in Costa Rica.

#### 49. *Porphyriola martinica* (Linnæus).

*Fulica martinica* LINNÆUS, Syst. Nat., 1766, I, 259.

*Porphyrio martinica* FRANTZIUS, Jour. für Orn., 1869, 375 (Pacaca, San Mateo, Santa Clara).—SALVIN, *Ibis*, 1870, 115 (Costa Rica [Carmiol]).

*Porphyriola martinica* SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 189 (Costa Rica [Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 327 (Laguna de Cartago [Underwood]).

U. S. Nat. Museum : Laguna de Coris (M. Carranza).

C. H. Lankester Collection : Matina.

Carnegie Museum : Mouth of Matina River (Carriker). One skin.

This species seems to occur all over the country up to 4,000 feet, wherever suitable conditions prevail. I found them fairly numerous in a lagoon at the mouth of the Matina River, where they were quite partial to the large patches of water-hyacinth. When flushed from these they would often fly into the Silico palms lining the banks of the lagoon and remain perfectly quiet among the leaves, where they were extremely difficult to see, their color seeming to blend perfectly with the dark green of the palm-leaves.

#### 50. *Fulica americana* Gmelin.

*Fulica americana* GMELIN, Syst. Nat., I, 704 (1788). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 143 (San Antonio [Frantzius, J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 375. (Between San José and Cartago.) — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131. — SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 221 (Central America). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 329 (references cited above).

Bangs Collection : Juan Viñas and San Juan (Underwood).

C. H. Lankester Collection : Las Concovas, 1908.

Evidently not very abundant so far south as Costa Rica. It is known to be found in the Laguna de Ochomogo and at Las Concovas near Cartago, at La Laguna del Infernillo at Juan Viñas, and probably at various points along the coast. I shot one bird in the lagoon at the mouth of the Matina River on November 14, 1907, but did not preserve it. It was swimming along the edge of the water-hyacinths and seemed very tame. I have not been able to learn at what date they arrive in the autumn, or leave in the spring.

#### Family HELIORNITHIDÆ.

#### 51. *Heliornis fulica* (Boddaert).

*Colymbus fulica* BODDAERT, Tabl. Pl. Enl., 1788, 54.

*Heliornis fulica* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 530 (Rio Frio).

SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 233 (Costa Rica [Endres]).

— SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 331 (references cited above).

C. H. Lankester Collection : Matina River.

Carnegie Museum : Bonilla and mouth of Rio Matina (Carriker).

Two skins.



This bird is evidently very rare in Costa Rica. Few specimens have been recorded from that country and in all my collecting I saw but three birds. A pair were shot on Laguna Grande at Bonilla, November 11, 1907, but no more were seen, while a single female was seen and secured in the lagoon at the mouth of the Matina River on November 14. When alarmed or pursued they dive and swim for long distances under the water, but do not remain under as long as the grebes under similar conditions. When closely pursued with a canoe they will dive repeatedly and if escape seems impossible will endeavor to hide in the vegetation at the edge of the water instead of flying. I have never seen it attempt to fly.

Family COLYMBIDÆ.

52. *Colymbus dominicus brachypterus* Chapman.

*Colymbus dominicus* LINNÆUS, Syst. Nat., I, 1766, 233. — FRANTZIUS, Jour. für Orn. 1869, 379 (Sarapiquí River). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 133 (Naránjo de Cartago).

*Podiceps dominicus* GRANT, Cat. Birds Brit. Mus., XXVI, 1898, 520 (Costa Rica [Endres and J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1904, 442 (Laguna de Ochomogo [Underwood *in litt.*]).

*Podilymbus dominicus* LAWRENCE, Ann. Lyc. N. Y., XX, 1868, 144 (Dota [F. Carmiol]).

*Colymbus dominicus brachypterus* CHAPMAN, Bull. Am. Mus. Nat. Hist., XII, Art. XIX (critical).

U. S. Nat. Museum: Laguna de Cartago; San José (Ridgway).

Bangs Collection: Pózo Azul de Pirris, Tenorio (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Fleming Collection: Azahar de Cartago (Underwood).

Carnegie Museum: Bonilla (Laguna Chiquita) and Buenos Aires (Carriker). Six skins.

A series of five males vary greatly in size, the wing ranging from 94 mm. to 104 mm. while the coloration is very different (probably due to age). Three birds have the whole head and neck dark sooty, two with a little sprinkling of white on the throat, while two others have the whole chin and throat white, the dusky color being restricted to a band across the upper chest. They average a little larger than the measurements given by Mr. Chapman for *brachypterus*, but are nearer that than true *dominicus*.

Ranges over the whole of Costa Rica, but prefers the more temperate regions, that is, between 1,000 and 5,000 feet. They were very abun-

dant on both Laguna Chiquita and Laguna Grande above Bonilla and were very tame, seeming to have no fear of a human being. I have never seen them in any of the lagoons near the coast, nor in any running water, but always in ponds and lakes.

53. **Podilymbus podiceps** (Linnæus).

*Colymbus podiceps* LINNÆUS, Syst. Nat., 1766, I, 223.

*Podilymbus podiceps* SCLATER and SALVIN, Ibis, 1859, 234.

Carnegie Museum: Bonilla (Carriker). One skin.

On November 11, 1907, I secured an immature male of this species on Laguna Chiquita, near Bonilla. No others were on the lake, nor did I see any on the large lake near by. I believe this to be the first record for the taking of the Pied-billed Grebe in Costa Rica.

Family LARIDÆ.

54. **Hydrochelidon surinamensis** (Gmelin).

*Sterna surinamensis* GMELIN, Syst. Nat., I, 1788, 604.

*Hydrochelidon nigra surinamensis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 133 (Puntarenas, one specimen).

*Hydrochelidon surinamensis* SAUNDERS, Cat. Birds Brit. Mus., XXV, 1896, 20.

—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 398 (Costa Rica — Zeledón's record).

I know of no other record of the taking of this bird on the coasts of Costa Rica. Doubtless, like many other sea-birds, they range up and down the coasts, but are rarely seen by persons who would recognize them.

55. **Sterna maxima** Boddaert.

*Sterna maxima* BODDAERT, Tabl. Pl. Enl., 1783, 58. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 133.

I found this tern quite abundant on the Caribbean coast about twelve miles below Port Limon in February, 1904. Several specimens were secured, which together with other skins were afterward accidentally lost. I did not notice it, or any other tern on the Pacific coast in June or October, while going and coming from Puntarenas to the mouth of the Rio Grande de Térraba.

In Zeledón's List (An. Mus. Nac. de Costa Rica, 1887) he gives four species of terns for Costa Rica, namely, *Sterna maxima*, *S. nilotica*, *S. fuliginosa*, and *S. anosthætus*, but gives no locality or indication that specimens of them had been secured. I am inclined to infer from

the arrangement, that he lists these species, not from the fact that specimens from Costa Rica are known to him, but because they are species which might pass up and down the coasts of Costa Rica during their migrations. As the present list only includes species known to have been actually taken in the country I omit the four terns listed by Zeledón.

56. **Anous stolidus** (Linnæus).

*Sterna stolidus* LINNÆUS, Syst. Nat., Vol. I, 227.

*Anous stolidus* RIDGWAY, Proc. U. S. Nat. Mus., XII, 116. — TOWNSEND, Bull. Mus. Comp. Zool., XXVII, 1895, 123. (Cocos Island — Steamer Albatross.)

“Abundant, four specimens collected. This species was noticed as most numerous, flying among the branches of the trees in the forest. The specimens are apparently referable to *A. stolidus*.” (Townsend.)

57. **Larus franklini** Swainson & Richardson.

*Larus franklini* SWAINSON and RICHARDSON, Fauna Bor.-Amer., II, 1831, 424, t. 71.

C. H. Lankester Collection: Port Limon. (Specimen identified by R. Ridgway.)

I have frequently seen gulls flying along the Caribbean coast, but never was able to shoot one. Mr. Lankester informs me that he secured a specimen which was identified by Mr. Ridgway as this species.

Family CHARADRIIDÆ.

58. **Arenaria interpres** (Linnæus).

*Tringa interpres* LINNÆUS, Syst. Nat., I, 1766, 248.

*Arenaria interpres* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 129 (Las Trojas). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 55 (Punta Mala). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 92. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 345 (above reference cited).

Probably only a very rare winter visitant on the Pacific coast.

59. **Hæmatopus palliatus** Temminck.

*Hæmatopus palliatus* TEMMINCK Man. D'Orn., II, 532. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (Capt. Dow). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 114 (no Costa Rican reference). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 347 (Bahia de Salinas [Mus. Nac. de Costa Rica, teste Underwood]).

Like the preceding, only a straggler in Costa Rica, conditions not being suitable for its wintering there.

60. *Squatarola squatarola* (Linnæus).

*Tringa squatarola* LINNÆUS, Syst. Nat., I, 149 (1758).

*Squatarola squatarola* CUVIER, Règne Animal, I, 467 (1817).

Carnegie Museum : Sea-beach, mouth Matina River, Nov. 14, 1907 (Carriker). Three skins.\*

61. *Charadrius dominicus* P. L. S. Müller.

*Charadrius dominicus* P. L. S. MÜLLER, Syst. Nat. Anhang, 1776, 116 (San Domingo). — CHERRIE, Auk, 1890, 333; 1892, 329 (San José, Dec. 2, 1889 [M. Carranza]). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 195. — SALVIN and GODMAN, Biol. Centr.-Am. Aves, III, 352 (references cited).

*Charadrius virginicus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (Costa Rica [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 378 (San José).

I have frequently seen the Golden Plover along the Caribbean beach during the winter months. Birds were taken at Old Harbor in February, 1904, but not preserved. I imagine it is quite rare in the interior, that being the reason why none have been recorded from there or from the Pacific coast.†

62. *Oxyechus vociferus* (Linnæus).

*Chradrius vociferus* LINNÆUS, Syst. Nat., I, 1766, 253. — FRANTZIUS, Jour. für Orn., 1869, 378 (San José).

*Ægialitis vocifera* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (C. R. [J. Carmiol]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 129 (Alajuela, San José, Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba, common); Auk, 1890, 333; 1892, 329 (San José). — UNDERWOOD, Ibis, 1896, 449 (Miravalles).

*Oxyechus vociferus* BOUCARD, P. Z. S., 1878, 44 (valley of San José). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 242 (San José [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 355 (Tambor, Laguna de Coris, Slopes of Irazú [Underwood *in litt.*]).

Bangs Collection : Cerro de Santa Maria, Jan. 6; Vicinity of San José, Azahar de Cartago (Underwood).

C. H. Lankester Collection : Cariblanco de Sarapiquí.

Carnegie Museum : Guácimo, El Hogar, Nov. 15 (Carriker).

One of the most abundant of the migrant shore-birds in Costa Rica, ranging over the lowlands of both coasts (more commonly on the Caribbean) and over the central plateau to about 5,000 feet. They were

\* Two males and a female of *S. squatarola* were taken by C. F. Underwood at Lepanto on March 16, 1909.

† A female of *C. dominicus* was taken by C. F. Underwood at Lepanto on March 16, 1909.

numerous about Guácimo and Guápiles, flying about the pastures, barnyards, and banana-plantations.

63. *Ægialitis semipalmata* (Bonaparte).

*Charadrius semipalmatus* BONAPARTE, Obs. Wilson, 1825, no. 219. — FRANTZIUS, Jour. für Orn., 1869, 378 (C. R.) 86.

*Ægialeus semipalmatus* SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 250. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 357 (Bahia de Salinas [Underwood *in litt.*]). — BANGS, Auk, 1907, 291 (Puntarenas, Aug. 20 [Underwood]).

*Ægialitis semipalmatus* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 55 (Rio Grande de Térraba).

Bangs Collection: Herradura de Puntarenas (Underwood).

Carnegie Museum: Coronado de Térraba, July 3 (Carriker). Two skins.

Evidently confined to the Pacific coast. A few remain during the summer, for what reason is not clear, except that they may be sick or not properly developed sexually. Mr. Cherrie found them during the summer along the lower Rio Grande River, as did Mr. Underwood and myself. This region of mud-flats (at low tide) seems to be a favorite wintering-ground for them.

64. *Ægialitis collaris* (Vieillot).

*Charadrius collaris* VIEILLOT, N. Dict. d'Hist. Nat., XXVII, 1817, 136.

*Ægialitis collaris* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 526 (Rio Frio, one specimen). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 288. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 359 (Richmond's record). — BANGS, Auk, 1907, 291 (El Pózo de Térraba, Barranca de Puntarenas, Herradura de Puntarenas (Underwood)).

Carnegie Museum: Cuábre, March 10, 1904, Rio Sicsola, Aug. 17, 1904 (Carriker). Two skins.

This little South American plover seems to be scattered sparingly along the Caribbean coast and along the rivers up to an altitude of nearly 1,000 feet. I have never seen it in any numbers, only one or two at one place.

65. *Himantopus mexicanus* (P. L. S. Müller).

*Charadrius mexicanus*, P. L. S. MÜLLER, Syst. Nat. Anhang., 1776, 117.

*Himantopus mexicanus* WAGLER, Isis, 1831, 520. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130 (Las Trojas). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 526 (Rio Frio, small flock Feb. 29). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 320. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 361 (references above cited).

I have never seen this bird in Costa Rica, and the only authorities for its presence in the Costa Rican List are the two references cited above.

66. **Numenius hudsonicus** Latham.

*Numenius hudsonicus* LATHAM, Ind. Orn., II, 712. — FRANTZIUS, Jour. für Orn., 1869, 377 (C. R.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130 (Puntarenas). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 364. — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 365 (San Lucas, [Underwood in litt.]).

C. H. Lankester Collection: San José, Sept. 15, 1907.

Carnegie Museum: El Coronado de Térraba, July 3 (Carriker). Two skins.

A rare winter visitant on the Pacific coast and the plateau region.

Of a small flock seen on a mud-flat, at Coronado, July 3, two were secured.

67. **Macrorhamphus griseus** (Gmelin).

*Scolopax grisea* GMELIN, Syst. Nat., I, 1788, 154.

*Macrorhamphus griseus* SCLATER and SALVIN, Ibis, 1860, 277. — FRANTZIUS, Jour. für Orn., 1869, 377 (Costa Rica). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 394. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 368 (Alajuela [Underwood in litt.]).

*Macrorhamphus scolopaceus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (C. R. [Frantzius]).

Although Mr. Lawrence gives the record for his birds as being *M. scolopaceus*, I have placed it under *M. griseus* for the reason that no specimens from Costa Rica of either species are available for determination, and following out the theory that it is more likely to be the eastern bird than the western (this usually has proven to be the case where eastern and western forms are considered), I have placed the two records under *M. griseus*.

68. **Catoptrophorus semipalmatus** (Gmelin).

*Scolopax semipalmata* GMELIN, Syst. Nat., I, 1788, 659.

*Catoptrophorus semipalmatus* BONAPARTE, Ann. Lyc. N. Y., II, 1827, 323. — RICHMOND, Proc. Biol. Soc. Wash., XVIII, 1905, 75. — BANGS, Auk, 1907, 291 (Puntarenas, Aug. 13, 1906 [Underwood]).

The above record published by Mr. Bangs is undoubtedly the first and only record of the taking of this bird in Costa Rica. There was but one specimen obtained, an immature bird, from which it was impossible to determine to which subspecies it belonged.

69. *Totanus melanoleucus* (Gmelin).

*Scolopax melanoleuca* GMELIN, Syst. Nat., I, 1788, 659.

*Totanus melanoleucus* FRANTZIUS, Jour. für Orn., 1869, 377 (San José). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 426 (San José, November 1 [J. Zeledón]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 373 (Puntarenas and Laguna de Cartago [Underwood *in litt.*]).

*Gambetta melanoleuca* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (San José [M. Calleja and F. Carmiol]).

A rare winter visitant on the western side of the plateau region and the Pacific coast.

70. *Totanus flavipes* (Gmelin).

*Scolopax flavipes* GMELIN, Syst. Nat., I, 1788, 659.

*Totanus flavipes* LICHTENSTEIN, Preis.-Verz. Mex. Vog., 3. — FRANTZIUS, Jour. für Orn., 1869, 377 (Costa Rica). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 431. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 374 (Alajuela and Laguna de Cartago [Underwood *in litt.*]).

*Gambetta flavipes* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (San José [M. Calleja and F. Carmiol]).

Bangs Collection: Azahar de Cartago, November 23 and March 2; La Estrella de Cartago, January 24 (Underwood).

C. H. Lankester Collection: Banana River, October 10, 1905.

It is very probable that the present species is a quite regular winter visitant, arriving in small numbers in the autumn and remaining until spring. Unlike some of the other shore-birds it frequents the Caribbean lowlands and the eastern part of the plateau region. I frequently saw them on the "Old Line" during December and January, but secured no specimens.

71. *Helodromas solitarius solitarius* (Wilson).

*Tringa solitaria* WILSON, Amer. Orn., VII, 1813, 53, pl. 58, fig. 3.

*Totanus solitarius* FRANTZIUS, Jour. für Orn., 1869, 377 (San José). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba); Auk, VII, 1890, 332; IX, 1892, 329 (San José, Sept. 1 to May 1). — UNDERWOOD, Ibis, 1896, 449 (Miravalles).

*Rhyacophilus solitarius* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (San José [M. Calleja and J. Carmiol]).

*Helodromas solitarius* SCLATER and SALVIN, Ibis, 1859, 229. — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 444 (San José [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 375 (Reventazón, Alajuela, Talamanca, Jiménez [Underwood *in litt.*]).

Bangs Collection: Tenorio, Jan. 29, San José, Sept. 15, Bolson, Dec. 10 (Underwood).

Carnegie Museum: Dec. 12, 1906 (Carriker), El Hogar. One skin.

It seems to be not uncommon throughout the greater part of the country during the winter, but never in any numbers. The specimen secured at El Hogar was the only one seen in that immediate vicinity that winter. It was usually to be seen beside a small pool of water, in a road running through a pasture. I saw it daily for at least two weeks before finally shooting it.

## 72. *Actitis macularia* (Linnæus).

*Tringa macularia* LINNÆUS, Syst. Nat., I, 1766, 249.

*Tringoides macularius* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (C. R. [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 378 (C. R.). — BOUCARD, P. Z. S., 1878, 44 (Valley of San José). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896.

*Tringoides macularia* SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 468 (San José [J. Carmiol], Irazú District [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 378 (San Lucas, Puntarenas, Jiménez, Alajuela, Carrillo, Civita Simon [Underwood in litt.]).

*Actitis macularia* RIDGWAY, Proc. U. S. Nat. Mus., VIII, 581. — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba); Auk, VII, 1890, 332; IX, 1892, 329 (San José, common from Oct. 1 to March 1). — UNDERWOOD, Ibis, 1896, 449 (Miravalles). — BANGS, Auk, XXIV, 1907, 291 (Barranca de Puntarenas and El Pózo de Térraba [Underwood]).

*Tringoides hypoleucus* FRANTZIUS, Jour. für Orn., 1869, 377 (San José).

Bangs Collection: Bolson and San José (Underwood).

Fleming Collection: Carrillo (Underwood).

Carnegie Museum: Guápiles, Mar. 5, Ujurrás de Térraba, Sept. 16, Tucurríqui, Nov. 1, La Estrella de Cartago, Nov. 5 (Carriker). Five skins.

The most abundant of the shore-birds in Costa Rica, and found from the coast up to at least 5,000 feet, more abundant from 500 feet to 3 000 feet. They are usually seen along the margins of swiftly running creeks and streams, but also to some extent frequent ponds and lakes.

## 73. *Bartramia longicauda* (Bechstein).

*Tringa longicauda* BECHSTEIN, Kurze Uebers. Lat., Ind. Orn., II, 1812, 453 Pl. 184.

*Bartramia longicauda* BAIRD, BREWER, and RIDGWAY, Water-Birds of N. Amer., I, 296. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 129 (Alajuela). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba); Auk, VII, 1890, 332; IX, 1892, 329 (San José, from Sept. 5 to Nov. 14). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 509. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 380 (references cited).



*Actiturus bartramius* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (C. R. [Carmioli]).

Am. Mus. Nat. History: San José, Sept. 18, 1889 (Underwood).

Bangs Collection: San José, Sept. 15 (Underwood).

C. H. Lankester Collection: San José, Sept. 15, 1907.

Carnegie Museum: Guácimo, Oct. 13, 1903 (Carriker). One skin.

This species is a common winter visitant on the "sabanas" about San José, but apparently does not remain there all winter. I found it common there in October, 1907. The single specimen secured at Guácimo was shot in a newly ploughed field and no more were seen. I suspect that it does not descend much into the low country, but remains on the plateau.

#### 74. *Ereunetes pusillus* (Linnæus).

*Tringa pusilla* LINNÆUS, Syst. Nat., I, 1766, 252.

*Ereunetes pusillus* BAIRD, BREWER, and RIDGWAY, Water-Birds N. Amer., I, 1884, 205. — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 514. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 382 (Guatemala and Panama). — BANGS, Proc. Biol. Soc. Wash., XIX, 102 (San José, Sept. 15, 1898 [Underwood]).

Carnegie Museum: Coronado de Térraba, July 3, 1907 — ♂ & ♀ (Carriker). Two skins.

Evidently only a rare straggler in Costa Rica. I can find no records for its occurrence there besides the single specimen recorded by Mr. Bangs and the two secured by myself. These two were secured on a mud-flat along a salt-lagoon, or rather on one of the branches of the delta of the Rio Grande, and were two of a flock of about a dozen birds. It is a remarkable occurrence to get this bird in Costa Rica at that late date, but most likely, having missed the regular return flight, they would have spent the summer there.

#### 75. *Ereunetes mauri* Cabanis.

*Ereunetes mauri* CABANIS, Jour. für Orn., 1856, 419. — Auk, XXV, 1908, Fourteenth Supp. A. O. U. Check List, 367.

*Ereunetes occidentalis* BANGS, Auk, XXIV, 1907, 291 (Barranca de Puntarenas, August [Underwood]).

Two specimens were taken by Underwood at Barranca de Puntarenas on August 12 and 20, 1906, while another was secured at La Herradura de Puntarenas on August 12. These specimens are apparently the only records for the occurrence of this species in Costa Rica.

76. *Tryngites subruficollis* (Vieillot).

*Tringa subruficollis* VIEILLOT, N. Dict. d'Hist. Nat., XXXIV, 465.

*Tringites subruficollis* SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 521. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 384 (San José [Underwood *in litt.*]) — CHERRIE, Auk, VII, 1890, 332; 1892, 329 (San José — come and disappear with *Bartramia longicauda*).

*Tringites rufescens* FRANTZIUS, Jour. für Orn., 1869, 377 (Costa Rica).

U. S. Nat. Museum: San José, Sept. 7, 1890 (Cherrie).

Am. Mus. Nat. Hist.: San José, Sept. 18, 1889 (Underwood).

Bangs Collection: Vicinity of San José, Oct. 8 (Underwood).

C. H. Lankester Collection: San José, Sept. 15, 1907.

Seems not to be a common visitor, stopping only in the highlands and not remaining all winter.

77. *Pisobia minutilla* (Vieillot).

*Tringa minutilla* VIEILLOT, N. Dict. d'Hist. Nat., XXXIV, 466. — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 526 (Rio Frio — two specimens).

*Limonites minutilla* SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 548 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 387 (San José [Underwood *in litt.*]). — BANGS, Auk, 1907, 291 (Barránca, El Pózo, Aug. 10 and April [Underwood]).

*Tringa wilsoni* FRANTZIUS, Jour. für Orn., 1869, 377 (San José).

*Pisobia minutilla*, Fourteenth Supp. A. O. U. Check List, Auk, 1908, 367.

C. H. Lankester Collection: Chomez, Jan., 1904.

Carnegie Museum: La Estrella de Cartago, Nov. 5, 1907. One skin.

Not at all common as a winter resident, and seldom seen.

78. *Pisobia maculata* (Vieillot).

*Tringa maculata* VIEILLOT, N. Dict. d'Hist. Nat., XXXIV, 465. — CHERRIE, Auk, VII, 1890, 332; 1892, 329 (comes and goes with *Bartramia longicauda*).

*Heteropygia maculata* SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 562. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 389 (Reventazón, Laguna de Cartago [Underwood *in litt.*]).

*Tringa pectoralis* FRANTZIUS, Jour. für Orn., 1869, 377 (Costa Rica).

*Pisobia maculata* Fourteenth Supp. A. O. U. Check List, Auk, XXV, 1908, 367.

U. S. Nat. Museum: San José, Sept. 7, 1890 (Cherrie).

C. H. Lankester Collection: Ochomogo.

Bangs Collection: Buenos Aires de Térraba, May 26–29, San José, May 19, Azahar de Cartago, Oct. 20 and Nov. 3 (Underwood).

Very probably always present during the winter in small numbers, scattered over the higher parts of the country. I never saw it in the Caribbean lowlands.

79. *Pisobia bairdi* (Coues).

*Actodromas bairdi* COUES, Proc. Acad. Nat. Sci. Phila., 1861, 194.

*Tringa bairdi* CHERRIE, Auk, XII, 1895, 87 (Tierra Blanca, two specimens, June 8, 1895).

*Heteropygia bairdi* SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 570. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 390 (no C. R. records). — Bangs, Proc. Biol. Soc. Wash., XIX, 102 (Cerro de Candelaria—1 ♀ [Underwood]).

*Pisobia bairdi*, Fourteenth Supp. A. O. U. Check List, Auk, XXV, 1908, 367.

Am. Mus. Nat. History: San José, Sept. 18, ♂ & ♀ (Underwood).

Only a rare winter visitant on the central highlands.

80. *Gallinago delicata* (Ord).

*Scolopax delicata* ORD, ed. Wils. Am. Orn., VI, 18, Pl. 147, f. 1.

*Gallinago delicata* ZELEDÓN, An. Mus. Nac. de C. R., 1, 1887, 129 (San José).

—CHERRIE, Auk, IX, 1890, 332; 1892, 329 (San José, not uncommon from Oct. 1 to Feb. 15). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893 (San Carlos, common in Feb.). — SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 642 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 392 (other records cited).

*Gallinago wilsoni* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 141 (Frantzius).

*Scolopax wilsonii* FRANTZIUS, Jour. für Orn., 1869, 377 (C. R.).

Bangs Collection: Tenorio, Jan. 23, Azahar de Cartago, Nov. 10, Cartago, Dec. 13 (Underwood).

Carnegie Museum: La Estrella de Cartago, Nov. 5, 1907 (Carriker). One skin.

Quite common over nearly the whole country where marshy land is to be found and especially abundant about La Laguna de Ochomogo, between Cartago and San José.

Mr. Lankester and myself found them abundant there during November, but they are always speedily shot off by foreigners from San José. There were always a few in the marshy pastures about Guápiles and other points on the "Old Line."

81. *Lobipes lobatus* (Linnæus).

*Tringa lobata* LINNÆUS, Syst. Nat., I, 1766, 149.

*Phalaropus hyperboreus* SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 698. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 394 (Desamparados [Underwood in litt.]).

*Lobipes lobatus* STONE, Auk, XXIV, 1907, 196.

The presence of the Northern Phalarope in the list of Costa Rican birds rests wholly on the record in the "Biologia," as having been taken

by Underwood at Desamparados. It is a bird which cannot possibly be mistaken for any other species, hence there can be no doubt as to the validity of the record.

Family PARRIDÆ.

82. *Asarcia variabilis* (Linnæus).

*Parra variabilis* LINNÆUS, Syst. Nat., I, 1766, 260.

*Parra gymnostoma* FRANTZIUS, Jour. für Orn., 1869, 375 (Lake of Ochomogo and Salitral de San Antonio). — SALVIN, Ibis, 1870, 116 (Costa Rica). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 409 (La Palma de Nicoya).

*Jacana gymnostoma* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131 (Las Trojas, Alajuéla, Siquirres). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba).

*Asarcia variabilis* SHARPE, Cat. Birds Brit. Mus., XXIV, 1896, 86 (Costa Rica [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 342 (above references cited). — BANGS, Auk, XXIV, 1907, 291 (Puntarenas [Underwood]).

Bangs Collection: Tenorio, Barranca de Puntarenas, Ochomogo (Underwood).

Carnegie Museum: Miravalles and mouth of Matina River (Carriker).  
Six skins.

Scattered pretty well over the whole country where suitable conditions are to be found, although more abundant at lower altitudes. They were quite abundant on the lagoon at the mouth of the Matina River, where they were feeding among the water-hyacinths and running about on the water-plants. They always seem to be extremely shy wherever found and are very hard to kill, not only from their shyness, but from the fact that their skin is very tough, seemingly impervious to a charge which would riddle most birds of the same size. I saw a single bird in a pasture near Guápiles, others beside a lagoon near Old Harbor, quite a number on the lower Sicsola River and a single family of birds on Laguna Chiquita near Bonilla.

They are very noisy, emitting harsh cries when alarmed, are strong flyers, and have the curious habit of lifting their wings perpendicularly to their fullest extent when standing on the ground.

Family ŒDICNEMIDÆ.

83. *Œdicnemus bistriatus* (Wagler).

*Charadrius bistriatus* WAGLER, Isis, 1829, 648 (Mexico).

*Œdicnemus bistriatus* GRAY, List Grallæ Brit. Mus., 1844, 59. — FRANTZIUS, Jour. für Orn., 1869, 378 (San José). — SHARPE, Cat. Birds Brit. Mus.,

XXIV, 1896, 12. — SALVIN and GODMAN, Biol. Centr. Am., Aves, III, 339 (Frantzius' record).

Evidently a very rare straggler in Costa Rica, since we know of but a single bird having been taken there by Frantzius at San José. It is found quite commonly to the north and to the south of Costa Rica and it is rather odd that it should be so rare here, where conditions in the central highlands are quite suitable for its presence.

#### Family ARAMIDÆ.

##### 84. *Aramus vociferus* (Latham).

*Numenius vociferus* LATHAM, Suppl. Ind. Orn., 1801, lxv. — Fourteenth Suppl. A. O. U. Check List, Auk, XXIV, 1908, 364 (RICHMOND MS.).

*Aramus pictus* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 409 (La Palma de Nicoya). — SHARPE, Cat. Birds Brit. Mus., XXIII, 1894 (Costa Rica [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 333 (other references cited).

*Aramus giganteus* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 528 (Rio Frio).

*Aramus holostictus* SALVIN, Ibis, 1870, 115 (Costa Rica).

Bangs Collection: Bolson (Underwood).

Carnegie Museum: Bebedéro (Carriker). One skin.

With the exception of Dr. Richmond's record from Rio Frio, all the specimens known to have been collected in Costa Rica came from the basin of the Tempisque River in Guanacaste, namely, La Palma, Bebedéro, and Bolson. The one recorded by Salvin in 1870 was no doubt taken by Arcé while collecting at Bebedéro. They are found in the forests which border the rivers of that region and are very shy.

#### Family EURYPYGIDÆ.

##### 85. *Eurypyga major* Hartlaub.

*Eurypyga major* HARTLAUB, Syst. Verz. Mus. Bremen, 1844, 108. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (Angostura [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 377 (Machuca and Aguacate Mts.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131 (Pózo Azul de Pirrís, Monte del Aguacate, Monte Redondo). — SHARPE, Cat. Birds Brit. Mus., XXIII, 1894, 242 (Valsa [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1903, 334 (above references cited).

Bangs Collection: Carrillo, Tenorio (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: El Hogar and Guápiles (Carriker). Two skins.

This rare and beautiful bird is distributed sparingly over the low-

lands of both the Atlantic and Pacific slopes, up to not more than 2,000 feet above sea-level. They are denizens of the heavy forests, which they never leave, frequenting the banks of sluggish creeks, springs, and boggy spots. They are almost always to be seen in pairs and are not very shy, but with caution can be approached quite closely. Their usual station is on the ground, but when flushed they sometimes alight in the trees at no great height. I was never able to learn anything of their breeding habits, and indeed they are birds very rarely encountered.

Family IBIDIDÆ.

86. *Guara alba* (Linnæus).

*Scolopax alba* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 145. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130.

*Guara alba* STEJNEGER, Stand. Nat. Hist., IV, 1885, 9. — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 52 (Palmar).

*Ibis alba* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (Gulf of Nicoya, Coll. O. Salvin [Arcé]).

*Eudocimus albus* NUTTING, Proc. U. S. Nat. Museum, V, 1882, 407 (La Palma de Nicoya). — SHARPE, Cat. Birds. Brit. Mus., XXVI, 1898, 39 (Nicoya [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 192 (above references cited).

Carnegie Museum : Pózo Azul de Pirrís, Coronado de Térraba (Carriker). Five skins.

I found them quite common on the lower part of the Rio Grande de Térraba, especially in the delta, where they have good feeding-grounds on the mud-flats left by the receding tide. Only a few were noticed at Pózo Azul, along the Rio Grande de Pirrís. They are common in many places in Guanacaste, especially around the lower portion of the Tempisque River.

87. *Plegadis guarauna* (Linnæus). .

*Scolopax guarauna* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 242.

*Plegadis guarauna* RIDGWAY, Proc. U. S. Nat. Mus., I, 1878, 163. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130 (Costa Rica). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 52 (El Pózo de Térraba, one specimen, not common).

The above record by Mr. Cherrie is the only one I have seen of the taking of this bird in Central America, although it would seem quite natural that it should be found there. Señor Zeledón gives the bare record, but cites no specimen, so we cannot be positive concerning his record.

## Family PLATALEIDÆ.

88. *Ajaja ajaja* (Linnæus).

*Platalea ajaja* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 140. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (Costa Rica [Capt. J. M. Dow]). — FRANTZIUS, Jour. für Orn., 1869, 376 (Pirris and Tirribi). — BOUCARD, P. Z. S., 1878, 44 (near San José, 1 spec., April). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 190 (references cited).

*Ajaja ajaja* REICHENBACH, Av. Syst. Nat., 1852, p. xvi. — CHERRIE, Expl. Zool. en. C. R., 1891-2, 1893, 57 (Boca Zacate, common). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 527 (Rio Frio, flock of seven). — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 52.

*Ajaja rosea* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 407 (La Palma de Nicoya, common). — UNDERWOOD, Ibis, 1896, 450 (Miravalles, rare so high up).

Bangs Collection: Bolson (Underwood).

C. H. Lankester Collection: Palo Verde de Guanacaste.

Carnegie Museum: Bebedéro (Carriker). Two skins.

The Roseate Spoonbill is not uncommon in many parts of Costa Rica, keeping as a rule to the lowlands of the Pacific, especially the lagoons of Guanacaste. There are records for its occurrence in many other places, however, and even, though rarely, it gets as high as San José. Several birds were seen in the delta of the Rio Grande de Térraba, but were very wild and none were secured. I shot two birds in a small stream at Guápiles in April, 1905, but no others were ever seen on the Caribbean side. They are probably common about the lower part of the San Juan River, at least I have been told so.

## Family CICONIIDÆ.

89. *Mycteria americana* Linnæus.

(Native name "Garzon.")

*Mycteria americana* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 140. — Fourteenth Suppl. A. O. U. Check List, Auk, 1908, 363.

*Tantalus loculator* FRANTZIUS, Jour. für Orn., 1869, 376 (San José) (?). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 407 (La Palma de Nicoya, abundant). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130 (C. R.). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 52 (Palmar, common). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 527 (Rio Frio, common). — UNDERWOOD, Ibis, 1896, 449 (Miravalles, several noticed). — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 321. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 188 (references cited).

The Wood Ibis inhabits the lagoons of Guanacaste and the marshy

banks of rivers in various parts of the lowlands of western and northern Costa Rica.

90. **Jabiru mycteria** (Lichtenstein).

(Native name "Galan sin ventura.")

*Ciconia mycteria* LICHTENSTEIN, Abh. K. Akad. Wiss. Berlin (Phys. Kl.) for 1816-17, 1819, 163.

*Jabiru mycteria* ALLEN, Auk, XXV, 1908, 37, 38.

*Mycteria americana* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 407 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130. — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 526 (Rio Frio). — UNDERWOOD, Ibis, 1896, 450 (Miravalles, occasionally seen). — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 314. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 187 (references cited).

John E. Thayer Collection : Bolson (Underwood).

C. H. Lankester Collection : Palo Verde.

The Jabiru in Costa Rica is almost entirely confined to the lagoons of Guanacaste and Nicoya, but one record being known elsewhere (Rio Frio). It is not particularly rare, but is extremely wild and difficult to shoot, it being necessary to secure them with a rifle. They select some shallow lagoon and stand far out from shore whence they can see anyone approaching for a long distance.

Family ARDEIDÆ.

91. **Ardea herodias herodias** (Linnæus).

(Native name "Garza.")

*Ardea herodias* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 143. — LAWRENCE, Ann. Lyc. Nat. Hist. N. Y., IX, 1868, 142 (C. R. [Frantzius and J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 376 (San Antonio). — ZELEDÓN, An. Mus. Nac. de C. R., 130. — CHERRIE, Auk, 1890, 332; 1892, 329 (seen occasionally from Nov. to Jan.). — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 80 (San José [Frantzius], Port Limon [W. H. Milner]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 159 (San José, San Lucas, La Carpintera, Bebedéro, Miravalles [Underwood]).

Carnegie Museum : El Hogar, Jan. 2 (Carriker). One skin.

A rather rare winter visitor, going over the whole country wherever suitable conditions are found, up to 5,000 feet.

92. **Herodias egretta** (Gmelin).

*Ardea egretta* GMELIN, Syst. Nat., I, ii, 1788, 629. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130 (San José, Desamparados, Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba); Auk, 1890,



332; 1892, 329 (San José, sometimes seen between Nov. and Jan. inclusive).

— RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 527 (San Carlos River).

— UNDERWOOD, Ibis, 1896, 450 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 161 (San Lucas and Bebedéro [Underwood]).

*Herodias egretta* CABANIS, Jour. für Orn., 1856, 341. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (Costa Rica [Frantzius and J. Carmiol]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 406 (La Palma de Nicoya). — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 95 (San José [J. Carmiol]).

*Ardea leuce* FRANTZIUS, Jour. für Orn., 1869, 376 (C. R.).

C. H. Lankester Collection: Guanacaste.

Carnegie Museum: Pozó Azul de Pirrís and Guápiles (Carriker).

Two skins.

This is a common heron throughout the lower parts of the country on both slopes, frequenting the edges of streams and marshy pastures, but is very shy as a rule and hard to approach. It is also found in the interior, but in fewer numbers. I have never seen more than two together and usually they are to be found singly.

### 93. *Florida cærulea cærulea* (Linnæus).

*Ardea cærulea* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 143. — FRANTZIUS, Jour. für Orn., 1869, 376 (C. R.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130 (Puntarenas). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba); Auk, 1890, 332; 1892, 329 (San José; not rare in Dec. and Jan., but only birds of the year are met with). — UNDERWOOD, Ibis, 1896, 450 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 165 (Bebedéro and Pózo Azul [Underwood]).

*Florida cærulea* BAIRD, Pac. R. R. Repts., IX, 1858, 671. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (C. R. [Frantzius]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 406 (La Palma de Nicoya). — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 100 (Péje [Carmiol], Puntarenas [J. M. Dow]).

Bangs Collection: Rancho Redondo and Guanacaste (Underwood).

Carnegie Museum: Guápiles, El Pózo de Térraba (Carriker). Five skins.

With the exception of *Butorides virescens maculata*, the most abundant heron in Costa Rica. While not so abundant in the highlands, it is to be seen on both the Pacific and Caribbean lowlands in considerable numbers. They are very fond of feeding in wet or marshy pastures, and a flock can almost always be found in pastures of any size. They also frequent the streams.

94. *Egretta candidissima candidissima* (Gmelin).

*Ardea candidissima* GMELIN, Syst. Nat. I, ii, 1788, 63. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130 (Liberia). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 527 (Rio Frio). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 162 (C. R.).

*Garzetta candidissima* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (C. R. [J. M. Dow]).

*Leucophoyx candidissima* SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 124.

*Egretta candidissima*, GOSSE, Birds of Jamaica, 1847, 336.

C. H. Lankester Collection : Guanacaste.

With the exception of *Agamia agami* this beautiful heron has become, through the efforts of the plume-hunters, the rarest of the family in Costa Rica. I have never seen it on the Caribbean coast or rivers, although it probably does occur in small numbers along the lower part of the San Juan River and the lagoons contiguous to it. It is only in the marshes and lagoons of Guanacaste that it is still found in any number and even there I understand they are lately becoming very rare.

95. *Hydranassa tricolor ruficollis* (Gosse).

*Egretta ruficollis* GOSSE, Birds of Jamaica, 1847, 338.

*Demiegretta ludoviciana* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (C. R. [Frantzius]).

*Ardea tricolor ruficollis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 150 (Puntarenas).

*Hydranassa ruficollis* SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 127.

*Ardea tricolor* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 164.

A rare migrant in Costa Rica, Puntarenas being the only locality at which it has been known to be taken.

96. *Nyctanassa violacea* (Linnæus).

*Ardea violacea* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 143.

*Nycticorax violaceus* FRANTZIUS, Jour. für Orn., 1869, 376 (San José). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131 (Las Trojas and Alajuela). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 52 (Pantanos de Sierepe); Auk, VII, 1890, 332; IX, 1892, 322 (San José, resident, but adult birds seldom seen).

*Nyctanassa violacea* SHARPE, Bull. B. O. C., V, 1895, xi. — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 130 (Costa Rica [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 174 (references cited).

Bangs Collection : Bolson (Underwood).

C. H. Lankester Collection : Limon.

Carnegie Museum: El Pózo de Térraba (Carriker). One skin.

Found sparingly all over the country up to about 4,000 feet, more abundant in the lowlands, especially of the Pacific. I found it in the swamps just inside of the beach about twelve miles south of Port Limon.

97. *Agamia agami* (Gmelin).

*Ardea agami* GMELIN, Syst. Nat., I, 1788, 629. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 171.

*Agamia picta* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131 (Pózo Azul de Pirris).

*Agamia agami* SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 135 (no C. R. record).

C. H. Lankester Collection: Laguna de Ochomogo.

Carnegie Museum: Pózo Azul de Pirris (Carriker). One skin.

This beautiful heron is evidently extremely rare in Costa Rica. We have but one published record of its collection, the specimen from Pózo Azul, recorded by Señor Zeledón. Mr. Cherrie tells me that he also took a specimen at Pózo Azul, while the only one I saw during my residence of five years was in the same locality. Mr. Lankester records one from Laguna de Ochomogo, between San José and Cartago, which seems to be a very unusual occurrence for this species. The one which I secured was shot in the shallow margin of the Rio Grande de Pirris.

98. *Nycticorax nycticorax nævius* (Boddaert).

*Ardea nævia* BODDAERT, Tabl. Pl. Enl., 1783, 56.

*Nycticorax nycticorax* SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 146.

*Nycticorax griseus nævius* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 406 (La Palma de Nicoya).

*Nycticorax nycticorax nævius* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131. (Liberia). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 528 (Rio Frio).

*Nycticorax americanus* FRANTZIUS, Jour. für Orn., 1869, 376 (C. R.).

Bangs Collection: San José (Underwood).

A winter resident over the greater part of the country up to 4,000 feet, but probably commoner in the lowlands of the Pacific. I saw hem in November on the Matina River near its mouth.

99. *Cochlearius zeledoni* (Ridgway).

*Cancroma zeledoni* RIDGWAY, Proc. U. S. Nat. Mus., VIII, 1885, 93. — ZELEDÓN, An. Mus. Nac. C. R., I, 1887, 130 (Pózo Azul de Pirris and Las Trojas). — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 165. — SALVIN and GODMAN,

Biol. Centr.-Am., Aves, III, 1901, 185 (references cited). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 52 (Rio Grande de Térraba).

*Cancroma cochlearia* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (Rio Grande [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 376 (C. R.). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 496 (La Palma de Nicoya).

*Cochlearia zeledoni* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 527 (Rio Frio).

Bangs Collection : Bolson (Underwood).

C. H. Lankester Collection : Cimmarones.

Carnegie Museum : Pózo Azul de Pirrís and Las Ajuntaderas de Térraba (Carriker). Two skins.

Ranges over the lowlands of both the Pacific and Caribbean, but is more abundant on the Pacific side. Their habits are very similar to those of *Tigrisoma* and *Heterocnus*, that is, they are usually seen perched on a low limb of a tree on the edge of some creek or river. They are quite tame and easily approached. They evidently feed during the early morning and evening and perhaps during the night after the manner of the night-herons, hiding away during the hours of daylight.

#### 100. *Butorides virescens maculata* (Boddaert).

*Ardea virescens* FRANTZIUS, Jour. für Orn., 1869, 376 (Salitral, Rio Tirribi). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 130 (Liberia, Desamparados, San Joaquin, San José). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893 (Rio Grande de Térraba); Auk, VII, 1890, 332; IX, 1892, 329 (San José, tolerably common resident). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 169 (Talamanca, Bahia de Salinas, Alajuela, Puntarenas, San Lucas, Las Trojas, La Estrella, Azahar, Jiménez (Underwood)).

*Butorides virescens* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (C. R. [Frantzius]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 406 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 502 (San José, Nutting). — UNDERWOOD, Ibis, 1896, 450 (Miravalles). — SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 186 (C. R. [J. Carmiol and Endres]). — BANGS, Auk, XXIV, 1907, 289 (El Pózo de Térraba).

*Butorides virescens maculata* BANGS, Birds of Isle of Pines, Amer. Nat., XXXIX, 1905, 188.

Bangs Collection : Azahar de Cartago and San José (Underwood).

Carnegie Museum : Guápiles, Cuábres, El Pózo de Térraba (Carriker). Five skins.

The most abundant and most widely distributed of all the herons in Costa Rica. It is found over the whole of the country wherever creeks, rivers, or ponds exist, up to an altitude of not less than 5,000

feet, and in a few instances it has been taken even higher than that. It seems to be resident wherever found, but I have never seen the nest. Habits identical with those of the species in North America.

101. ***Tigrisoma lineatum*** (Boddaert).

*Ardea lineatum* BODDAERT, Tabl. Pl. Enl., 1783, 52.

*Tigrisoma lineatum* SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 195. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 178 (Panama, southward).

*Tigrisoma excellens* RIDGWAY, Proc. U. S. Nat. Mus., X, 1887, 595 (type from Rio Segovia, Honduras, taken also in Talamanca [José Zeledón]).

Carnegie Museum: El Hogar, Aug. 23, 1906 — immature ♀ (Carriker).

In the collection of the Carnegie Museum is a good series of skins of *T. lineatum*, both adults and young, from Colombia. When these specimens were carefully compared with Mr. Ridgway's description of *T. excellens*, no differences could be detected, and it therefore seems to me that *T. excellens* should be placed under the synonymy of the present species. The single immature female taken at El Hogar is identical with Colombian specimens in the same stage of plumage. This bird was shot from a tree beside a small stream in the forest.

102. ***Heterocnus cabanisi*** (Heine).

*Tigrisoma cabanisi* HEINE, Jour. für Orn., 1859, 407. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 142 (San Carlos [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 376 (Rio Macho). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 406 (La Palma de Nicoya). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 52 (Boca Mala). — UNDERWOOD, Ibis, 1896, 450 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 179.

*Heterocnus cabanisi* SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 198 (Costa Rica [Carmiol]).

Carnegie Museum: Guápiles, Miravalles, Coronado de Térraba (Carriker). Five skins.

Restricted almost entirely to the lowlands of both coasts, up to about 1,200 feet. Frantzius records the taking of a specimen at the Rio Macho which has an altitude of about 3,000 feet. If the bird was actually taken there (which I doubt) it is a very unusual occurrence. They appear to be more abundant on the Pacific coast, are always met with (during the day) in the trees along the edges of rivers and lagoons, and are quite solitary in their habits. I found them particularly abundant along the lower portion of the Rio Grande de Térraba, especially in the delta.

103. *Botaurus lentiginosus* (Montagu).

*Ardea lentiginosa* MONTAGU, Orn. Dict. Suppl., 1813.

*Botaurus lentiginosus* SHARPE, Cat. Birds Brit. Mus., XXVI, 1898, 259.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 182 (Guatemala and Panama).—BANGS, Auk, XXIV, 1907, 102 (Reventazón [Underwood]).

C. H. Lankester Collection: Cariblanco and Turrúcares.

The only published record of the occurrence of the Bittern in Costa Rica is that of Mr. Bangs (Auk, 1907, 102). This seems rather odd, because it is not an exceedingly rare bird there. Mr. Lankester reports the taking of two specimens and tells me he saw others. I myself saw two birds at the Laguna de Ochomogo in November, 1907, where they were flushed from the water plants encircling the lagoon.

## Family ANATIDÆ.

104. *Cairina moschata* (Linnæus).

*Anas moschata* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 199, n. 16.

*Cairina moschata* MOORE, P. Z. S., 1859, 65.—FRANTZIUS, Jour. für Orn., 1869, 378 (Guanacaste).—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 408 (La Palma de Nicoya).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba).—SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 51.—UNDERWOOD, Ibis, 1896, 451 (Miravalles).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 198 (records cited).

Bangs Collection: Bolson (Underwood).

C. H. Lankester Collection: Palo Verde.

Carnegie Museum: Bebedéro, Bagáces, Miravalles (Carriker). Three skins.

A common duck over the greater part of the Pacific coast region, but much more abundant in Guanacaste. I saw it on the Rio Grande de Térraba and at Buenos Aires, where I flushed three birds from a rice-field some distance from the river. On one occasion I saw a single bird flying near Guácimo, not far from the Guácimo River. This is the only record I have noticed from the Caribbean, but doubtless the bird is found on the lower San Juan River and contiguous lagoons. This duck seems to be very difficult to domesticate in Costa Rica, while *Dendrocygna autumnalis* is seen in a domesticated condition in many places on the Pacific coast.

105. *Dendrocygna viduata* (Linnæus).

*Anas viduata* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 205, n. 38.

*Dendrocygna viduata* EYTON, Monogr. Anat., 110 (1838).—CARRIKER, Ann. Carnegie Museum, Vol. IV, Nos. III and IV, p. 302 (Bebedéro, April 1, 1908).

C. H. Lankester Collection: Bebedéro.

Carnegie Museum: Bebedéro (Carriker).

To Mr. C. H. Lankester belongs the credit of first adding this duck to the Costa Rican ornithology, he having secured a specimen at Bebedéro, in June, 1906. As far as I am able to ascertain, these two birds are the only ones which have ever been taken in Central America. A few others were seen at Bebedéro, but it was not common, and was seen in company with *D. autumnalis*, in the lagoons about that place.

106. *Dendrocygna autumnalis* (Linnæus).

(Native name "Pichi.")

*Anas autumnalis* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 127.

*Dendrocygna autumnalis* EYTON, Monogr. Anat., 1838, 109. — LAWRENCE, Ann.

Lyc. N. Y., IX, 1868, 143 (Gulf of Nicoya, Coll. O. Salvin). — FRANTZIUS, Jour. für Orn., 1869, 379 (Guanacaste). — SCLATER and SALVIN, P. Z. S., 1876, 374 (Gulf of Nicoya [Arcé]). — BOUCARD, P. Z. S., 1878, 44 (Laguna at El Alto). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 530 (Rio Frio, common). — UNDERWOOD, Ibis, 1896, 450 (Miravalles to Bebedéro).

*Dendrocygna autumnalis* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 408 (La Palma de Nicoya). — SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 159 (Nicoya [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 205 (references cited).

C. H. Lankester Collection: Palo Verde.

Carnegie Museum: Bebedéro (Carriker). Six skins.

Very abundant over the whole valley of the Tempisque River, but very scarce elsewhere. The only record I know for the interior of Costa Rica is that of Boucard (Laguna de Ochomogo), which is without question correct. Mr. Cherrie did not record it from the Térraba region, Mr. Underwood did not find it there, nor did I see a single bird anywhere in the delta of the Rio Grande, although conditions seemed favorable for them there. Evidently they are partial to the grassy lagoons of the "sabanas" of Guanacaste. It is easily domesticated and is to be seen about most of the houses of that region, toddling about in a string just like ordinary domestic ducks. They go off to the lagoons during the day to feed and swim, but always return.

107. *Dafila acuta* (Linnæus).

*Anas acuta* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 126.

*Dafila acuta* BONAPARTE, Comp. List, 1838, 56. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 143 (San José [M. Calleja]). — FRANTZIUS, Jour. für Orn., 1869, 378 (Cartago). — SCLATER and SALVIN, P. Z. S., 1876, 392 (Lawrence's

record cited). — SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 270 (San José [M. Calleja]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 213 (references cited).

Bangs Collection : Azahar de Cartago (Underwood).

C. H. Lankester Collection : Las Concovas, 1908, about 36 specimens.

A rare migrant in the interior part of the country and on the Pacific coast.

#### 108. *Querquedula discors* (Linnæus).

*Anas discors* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 205. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 132 (Cartago and San José). — CHERRIE, Auk, VII, 1890, 332; IX, 1892, 329 (San José, saw one on river Oct. 27).

*Querquedula discors* STEPHENS, Gen. Zool., XII, ii, 1824, 149. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 143 (San José, M. Calleja). — SCLATER and SALVIN, P. Z. S., 1876, 384 (Lawrence's record cited). — SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 299 (San José [M. Calleja and Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 215 (records cited). — BANGS, Auk, XXIV, 1907, 289 (El Pozó de Térraba, adults in April [Underwood]).

*Pterocyanea discors* FRANTZIUS, Jour. für Orn., 1869, 378 (San Antonio).

Bangs Collection : Vicinity San José, Azahar de Cartago, Tenorio (Underwood).

C. H. Lankester Collection : Las Concovas, 1908.

Carnegie Museum : Guápiles, March 28 (Carriker). One female.

This bird usually arrives in Costa Rica about the middle of October and stays in small numbers up to the end of March or early in April. It spreads out over the whole country from sea-level up to 5,000 feet, wherever creeks, rivers, ponds, lakes, or marshy pastures are found. It is abundant in December on the Matina River near its mouth, not many arriving there before that date. The first arrivals always seem to stop in the highlands. I shot two females at Turrúcares about Oct. 10, 1907.

#### 109. *Spatula clypeata* (Linnæus).<sup>1</sup>

*Anas clypeata* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 124.

*Spatula clypeata* BOIE, Isis, 1822, 564. — FRANTZIUS, Jour. für Orn., 1869, 378 (C. R.). — SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 306. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 218 (record of Frantzius cited).

<sup>1</sup> Since the above was written I am glad to be able to further confirm the presence of this species in Costa Rica by a record sent me by Mr. Lankester, who says he killed one male at Las Concovas.



The presence in the list of this species depends entirely on the single record given by von Frantzius in 1869, which has been repeated by Zeledón in his Catalogue and by Salvin and Godman in the Biologia. There are records from Guatemala and Colombia, while Mr. Bangs has a specimen from Divala, Chiriqui, so that there is no apparent reason why the bird should skip Costa Rica in its migrations, but it is evidently a very rare straggler there.

110. **Marila affinis** (Eyton).

*Fuligula affinis* EYTON, Monogr. Anat., 1838, 157. — SCLATER and SALVIN, P. Z. S., 1876, 400 (Lawrence's record). — SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 360. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 223 (record of Lawrence cited).

*Fulix affinis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 143 (San Antonio [Frantzius]).

*Aythya affinis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 131 (probably a repetition from Lawrence's Catalogue).

Like the preceding species, this bird seems to have been taken but once, by Frantzius at San Antonio.

111. **Nomonyx dominicus** (Linnæus).

*Anas dominica* LINNÆUS, Syst. Nat., ed. 12, 1766, 201.

*Nomonyx dominicus* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 15. — SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 438. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 227.

*Nomonyx dominicus* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 56, in text (Laguna de Sierepe).

U. S. Nat. Museum: Laguna de Coris, Nov. 25, ♀.

John E. Thayer Collection: Costa Rica, ♂ and ♀ (Underwood).

C. H. Lankester Collection: Las Concovas, one specimen, 1908.

The only published record for the occurrence of the Masked Duck in Costa Rica is that by Mr. Cherrie (cited above) and this seems to have been overlooked by all subsequent authors. Mr. Cherrie says that he saw two on the Laguna de Sierepe, which was the first record for Costa Rica and that subsequently (no date given) he took two specimens on the Laguna de Ochomogo, near Cartago.

112. **Erismatura jamaicensis** (Gmelin).

*Anas jamaicensis* GMELIN, Syst. Nat., I, 2, 1788, p. 519.

*Erismatura ferruginea* FRANTZIUS, Jour. für Orn., 1869, 378 (Irazú).

*Erismatura rubida* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 132.

*Erismatura jamaicensis*, SALVADORI, Cat. Birds Brit. Mus., XXVII, 1895, 445.

— SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1902, 228.

Like several other species of ducks, we have but one record of the taking of the Ruddy Duck in Costa Rica, but apparently this can be depended upon. Frantzius gives "Irazú" as the locality where this bird was collected, but I know of no place on the Volcan de Irazú where the bird would be likely to be found.

### Family PHALACROCORACIDÆ.

#### 113. *Phalacrocorax vigua vigua* (Vieillot).

*Hydrocorax vigua* VIEILLOT, N. Dict. d'Hist. Nat., VIII, 1817, 90.

*Phalacrocorax vigua* OGILVIE-GRANT, Cat. Birds Brit. Mus., XXVI, 1898, 378 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 154.

*Phalacrocorax brasiliensis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 132 (Rio Súcio). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba).

*Phalacrocorax* sp. RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 432 (Rio Frio).

Bangs Collection : Vicinity of San José (Underwood).

C. H. Lankester Collection : Matina River.

Carnegie Museum : Guácimo (Carriker). One skin.

The Costa Rican bird agrees exactly with specimens of true *P. vigua* from Colombia, as do also the birds from Panama in Mr. Bangs' Collection. It is very abundant during the fall and winter months in all the rivers of the Caribbean slope, following the larger streams well up into the interior. I do not know whether the birds are found on the Pacific coast or not, but I presume they are, although I have never seen them there.

The birds frequenting the Caribbean slope evidently breed on some island in the Caribbean not far distant from Costa Rica, and spend the time after the breeding season in the rivers inland. They are usually to be seen standing on a rock in the riffles, watching for fish, and can be seen by the hundreds in the Reventazón River alongside the railway to San José.

### Family PLOTIDÆ.

#### 114. *Anhinga anhinga* (Linnæus).

*Plotus anhinga* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 218. — LAWRENCE, Ann.

Lyc. N. Y., IX, 1868, 143 (Gulf of Nicoya [Coll. Salvin]). — FRANTZIUS, Jour. für Orn., 1869 (San José). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 405 (La Palma de Nicoya). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXVI, 1898, 419 (Nicoya [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 156.

*Anhinga anhinga* STEJNEGER, Stand. Nat. Hist., IV, 1885, 193. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 132 (C. R.). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 532 (Rio Frio).

Bangs Collection: Bolson (Underwood).

C. H. Lankester Collection: Mouth of Matina River.

A rare inhabitant of the lagoons and sluggish rivers on both the Caribbean and Pacific lowlands. Few specimens have been recorded and I never saw the birds alive in that country, although I quite thoroughly searched the lagoons about the mouth of the Matina River where Mr. Lankester secured his bird the previous year.

### Family SULIDÆ.

#### 115. *Sula leucogastra* (Boddaert).

*Pelicanus leucogaster* BODDAERT, Table Pl. Enl., 1783, 57.

*Sula sula* OGILVIE-GRANT, Cat. Birds Brit. Mus., XXVI, 1898, 436 (Port Limon [Capt. Milner]).

*Sula leucogastra* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, *part*.

Fleming Collection: Uvita Island, Limon (Underwood).

C. H. Lankester Collection: Uvita Island, Limon.

*S. leucogastra* is the Booby found along the Caribbean coast. The only locality where it occurs along the eastern coast of Costa Rica is in the vicinity of Port Limon. A large colony is resident on the Island of Uvita in Port Limon Harbor, while two small rocky islets off the mouth of the Moin River, a short distance up the coast, have other colonies. I never saw them anywhere south of Limon, between that point and Boca del Toro, Panama.

#### 116. *Sula etesiaca* Thayer and Bangs.

*Sula leucogastra* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 405 (La Palma de Nicoya). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 149, *part*.

*Sula fiber* FRANTZIUS, Jour. für Orn., 1869, 379 (Puntarenas).

*Sula brewsteri* OGILVIE-GRANT, Cat. Birds Brit. Mus., XXVI, 1898, 440, *part* (Pacific coast of Central America).

*Sula* sp. CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (at sea between Puntarenas and Rio Grande de Térraba).

*Sula etesiaca* THAYER and BANGS, Bull. Mus. Comp. Zool., XLVI, 1905, 92 (Gorgona Island; June 29, 1904; coll. E. A. & O. Bangs).

Carnegie Museum: At sea off mouth of Rio Grande de Térraba (Carriker). One skin.

I did not compare the Costa Rican skin with the type of *S. etesiaca*,

but there is no question that they are the same. Just what the status of this form is cannot be determined until a thorough revision is made of the whole group, which is in a very confused state.

I found these birds very common at sea off the delta of the Rio Grande de Térraba. They breed on the rocky islets off the coast a little farther north.

### Family FREGATIDÆ.

#### 117. *Fregata aquila* (Linnæus).

*Pelicanus aquilus* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 133.

*Tachypetes aquila* FRANTZIUS, Jour. für Orn., 1869, 379 (C. R.). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 405 (La Palma de Nicoya, abundant on shores of Gulf).

*Fregata aquila* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (along shore off Rio Grande de Térraba). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXVI, 1898, 443. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 139 (Nutting's record cited).

I often saw them flying along the Pacific coast between Puntarenas and the Rio Grande de Térraba, as well as on the Caribbean coast in the vicinity of Limon and to the southward.

### Family PHAETHONTIDÆ.

#### 118. *Phaethon æthereus* Linnæus.

*Phaethon æthereus* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 134. — ZELEDÓN, Ann. Mus. Nac. de C. R., I, 1887, 132 (C. R.).

*Phaethon flavirostris* SALVIN, Ibis, 1870, 116 (Gulf of Nicoya [Arcé]). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XXVI, 1898, 457 (Nicoya, March [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 138 (Gulf of Nicoya [Arcé]).

The only authentic record we have for the taking of either species of *Phaethon* within the limits of Costa Rica is the immature specimen collected by Arcé in the Gulf of Nicoya and recorded by Salvin in the Ibis, 1870, as an addition to Mr. Lawrence's Catalogue. This bird was recorded as *P. flavirostris* (equal *americana*), but upon later examination by Mr. Ogilvie-Grant it proved to be an immature *P. æthereus*, which would naturally be expected to occur there rather than *americanus*. *P. americanus* may very likely visit the Caribbean shores. but it has never been collected or recorded there.

## Family PELICANIDÆ.

119. *Pelecanus fuscus* Linnæus.

*Pelecanus fuscus* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 215.—FRANTZIUS, Jour. für Orn., 1869, 379 (C. R.).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 132 (C. R.).—OGILVIE-GRANT, Cat. Birds Brit. Mus., XXVI, 1898, 475 (Gulf of Mexico and Caribbean Sea).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 142, *part.*

Carnegie Museum: Mouth of Matina River, Nov. 16, 1907 (Carriker). One skin.

A common bird all along the Caribbean coast, especially about the mouths of the larger rivers, where they can almost always be seen in long lines, flying out to sea in the morning and returning in the evening, or perched about on the drift washed up on the beach.

120. *Pelecanus californicus* Ridgway.

*Pelecanus californicus* RIDGWAY, Water-Birds of N. Amer., II, 1884, 143.

*Pelecanus fuscus* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 405 (La Palma de Nicoya).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (along sea-shore off Rio Grande de Térraba). \*

In 1907 I saw numerous birds around Puntarenas and all along down the coast to the Rio Grande de Térraba, where they were very numerous about the mouths of the delta of that river.

Messrs. Salvin and Godman in the *Biologia* take a rather unusual position in regard to the validity of this species, for, after saying that it had been separated from *P. fuscus* by Mr. Ridgway and other American ornithologists on account of the color of the gular pouch during the breeding season, they take the statement of a Mr. Alvin Seale, a Californian collector, that this color varies in the Californian bird from yellow to dusky, and hence can not be a stable character. On this authority they place *P. californicus* under the synonymy of *P. fuscus*.

## Family CATHARTIDÆ.

121. *Sarcoramphus papa* (Linnæus).

(Native name "Rey de los Zopilotes.")

*Vultur papa* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 122.

*Cathartes papa* SHARPE, Cat. Birds Brit. Mus., I, 1874, 22.—BOUCARD, P. Z. S., 1878, 45. (Seen at San Mateo.)

*Gypagus papa* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (C. R.).—RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 522 (Rio Frio).—UNDER-

WOOD, Ibis, 1896, 447 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 131 (Pózo Azul [Underwood]).

*Gyparchus papa* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (Gulf of Nicoya [Coll. Salvin]). — FRANTZIUS, Jour. für Orn., 1869, 370 (Pacaca). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 405 (La Palma de Nicoya). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 51 (Buenos Aires).

*Sarcoramphus papa* ALLEN, Bull. Am. Mus. N. H., XXIV, 1908, 35, 38

U. S. Nat. Museum: Bonilla (Basulto).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Pózo Azul de Pirrís (Carriker). Two skins.

Distributed sparingly over the whole of the lower parts of Costa Rica. It rarely ascends above 3,000 feet and is much more abundant below 2,000 feet. They almost always come to the carcass of a cow or horse, and as a rule are not very shy, it being usually possible to approach within gunshot of them. When one or more of the King Vultures are feeding on a carcass, the Black and Turkey Vultures always keep at a distance, in a circle about the dead animal, waiting for the "King" to finish. The natives call it King of the Vultures ("Rey de los Zopilotes") in consequence of this habit, saying that out of respect for it, the others wait until it has finished. Of course there is nothing like respect connected with it, simply pure fear on the part of the smaller vultures, for they well know that they will be driven off if they approach.

## 122. *Catharista urubu brasiliensis* (Bonaparte).

(Native name "Zopilote.")

*Cathartes brasiliensis* BONAPARTE, Consp. Av., I, 1850, 9.

*Cathartes atratus* SALVIN, Ibis, 1869, 319 (Costa Rica — addition to Lawrence's Cat.). — UNDERWOOD, Ibis, 1896, 447 (Miravalles — common).

*Catharista atrata* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 405 (La Palma de Nicoya). — CHERRIE, Expl. Zool. en C. R., 1890-1 (Térraba Valley); Auk, VII, 1890, 333; IX, 1892, 328 (San José — common). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 132 (references cited).

*Catharistes atratus* SHARPE, Cat. Birds Brit. Mus., I, 1874, 24. — BOUCARD, P. Z. S., 1878, 45 (common everywhere). — ZELEDÓN, An. Mus. Nac. de C. R., 1887, 127.

*Cathartes fœtens* FRANTZIUS, Jour. für Orn., 1869, 370 (generally distributed).

*Catharista urubu brasiliensis* ALLEN, Bull. Am. Mus. N. H., XXI, 1905, 275.

Very abundant over the whole country, but more especially in the settled districts, where they perform the duties of scavengers, devouring refuse of all kinds, both vegetable and animal. With such poor sanitary conditions as are to be found throughout all the towns and

cities of the tropics, the inhabitants would speedily be wiped out by various plagues, were it not for these useful birds. In nearly all places they are protected by law.

### 123. *Cathartes aura aura* (Linnæus).

*Vultur aura* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 86.

*Cathartes aura* FRANTZIUS, Jour. für Orn., 1869, 370 (generally distributed). —

NUTTING, Proc. U. S. Nat. Mus., V, 1882, 405 (La Palma de Nicoya). —

ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127. — CHERRIE, Expl. Zool.

en C. R., 1890-1, 1893 (Térraba Valley); Auk, IX, 1892, 328 (San José — not common). — UNDERWOOD, Ibis, 1896, 447 (Miravalles). — SALVIN and

GODMAN, Biol. Centr.-Am., Aves, III, 1901, 134 (San José [Underwood]).

*Ænops aura* SHARPE, Cat. Birds Brit. Mus., I, 1874, 25. — BOUCARD, P. Z. S., 1878, 45 (San José).

Although widely distributed over the whole of the country, it is nowhere abundant, and is always seen singly or in pairs. They are equally common in the country and about the towns, but are more timid than the preceding species.

## Family FALCONIDÆ.

### KEY TO THE COSTA RICAN SPECIES.

- a. Underparts (not always including tail-coverts and thighs) uniformly colored: white, buffy-ochraceous, ashy-blue, black, sooty-brown, or plumbeous, without bars or streaks (rarely a few shaft-lines on chest or lower throat).
- b. Under parts pure white, black, blackish-brown, or plumbeous.
- c. Under parts black or blackish-brown or plumbeous; upper parts same color.
- d. Upper tail-coverts white apically for at least one inch, or else thighs bright rufous.
- e. Tail-coverts white, tarsus 115 mm.; thighs and under tail-coverts black.
- f. Tail with a broad white bar across the middle, white tip, and with the basal portion white, mottled with black.  
*Urubitinga urubitinga*, adult ♂ and ♀.
- ff. Tail with the basal portion black, crossed by a second narrow white bar; otherwise the same as the preceding.  
*Urubitinga urubitinga ridgwayi*, adult ♂ and ♀.
- ee. Thighs bright rufous, under tail-coverts white; sides of face black, streaked with white.  
*Parabuteo unicinctus harrisi*, adult ♂ and ♀.
- dd. Upper tail-coverts entirely black, or only narrowly tipped with white; thighs uniform with abdomen.
- e. Tail with numerous bars of blackish and white or grayish-white.

- f.* Larger (wing, 860; tail, 200 mm.); most of primaries white on inner web towards base and thickly barred with sooty (immature birds with white spots on breast).  
*Buteo abbreviatus*, adult ♂ and ♀.
- ff.* Smaller (wing, 280; tail, 160 mm.); inner webs of most of primaries white basally, without bars (black phase).  
*Buteo brachyurus*, adult ♂ and ♀.
- ee.* Tail with not more than four white bars and a white tip.
- f.* Lower parts black or sooty (not plumbeous).
- g.* Larger (wing, 380; tail 230 mm.); tail with four narrow white bars, basal ones narrower; base of tail black, upper tail-coverts tipped with white.  
*Urubitinga anthracina*, adult ♂ and ♀.
- gg.* Smaller (wing, 300; tail, 220); one bar and a large basal area of white; upper tail-coverts entirely black.
- h.* Tail longer (240 mm.); maxillary hook projecting below mandible not more than 5 mm.  
*Geranospizias niger*, adult ♂ and ♀.
- hh.* Tail shorter (220 mm.); maxillary hook at least 11 mm. long.  
*Leptodon uncinatus*, adult ♂ and ♀.
- ff.* Lower parts plumbeous (wing about 290; tail 140 mm.).
- g.* Inner webs of primaries largely chestnut; head and under parts ashy-plumbeous; tail black, with three white bars.  
*Ictinia plumbea*.
- gg.* No chestnut on primaries; tail gray, with a broad terminal band of black.  
*Rostrhamus sociabilis*, adult ♂ and ♀.
- cc.* Under parts pure white.
- d.* Upper parts mainly white or else whole head and nape white (sometimes a few black feathers on occiput).
- e.* Entirely white, except apical portion of quills and a sub-terminal bar on tail, black.  
*Leucopternis ghiesbreghti*.
- ee.* Only head and nape white, rest above dark.
- f.* Tail long and forked; no black feathers on occiput; inner secondaries largely white.  
*Elanoides furcatus*.
- ff.* Tail square; occiput black, shoulders white; tail and inner surface of primaries grayish-white, both barred with blackish (wing, 420).  
*Spiziastur melanoleucus*.
- dd.* No white on upper parts (crown mixed with white in *Pandion*).
- e.* Size large (wing 490); soles of feet strongly rugose; claws long and curving (longest 30 mm.).  
*Pandion haliaetus*, ♂ and ♀.
- ee.* Size smaller (wing 200 to 280 mm.); feet not strongly rugose.
- f.* Entire upper parts plumbeous or slaty-black.



- g.* Tail black, with plumbeous above; one white bar (wing 200).

*Leucopternis semiplumbea*, ♂ and ♀.

- gg.* Slaty-black above, tail grayish, with four bars of blackish-brown.

(White phase) *Buteo brachyurus*, ad. ♂ and ♀.

- ff.* Upper parts mainly black.

- g.* Crown, nape, and sides of head plumbeous, pure white below; tail barred with black and white bars of equal width.

*Leptodon cayennensis*, ad. ♂ and ♀.

- g.* Crown and nape black; chest with black shaft-streaks.

- h.* Tail with only three narrow white bars; no white on nape.

*Micrastur mirandollei*, ad. ♂ and ♀.

- hh.* Tail with four white bars and a white collar on nape.

*Micrastur brachypterus*, ad. ♂ and ♀.

- bb.* Under parts uniform buffy-ochraceous or cinnamon-buff, or else pale ashy-bluish, with chestnut thighs.

- c.* Pale bluish-ash below, thighs chestnut; crown black; back and wings plumbeous; tail black, with three white bars.

*Accipiter bicolor schistochlamys*, adult ♂ and ♀.

- cc.* Buff-ochraceous or cinnamon-buff below.

- d.* No white on rump.

- e.* Pileum and nape buff-ochraceous, with black shaft-streaks; sides of head with a black patch.

*Herpetotheres cachinnans*, ♂ and ♀.

- ee.* Pileum sooty black like back.

- f.* Whole inner side of quills alternately barred with grayish-white and sooty; thighs deep buff-ochraceous or cinnamon-buff.

*Accipiter bicolor schistochlamys*, ♂ and ♀, juv.

- ff.* Only basal portion of quills white, with about four narrow sooty bars; thighs same color as breast.

- g.* A white or buff-white nuchal collar; tail with four narrow white bands (dorsal aspect).

*Micrastur brachypterus*, ♂ and ♀, juv.

- gg.* No white or buff nuchal collar; only three white bars on tail. *Micrastur mirandollei*, ♂ and ♀, juv.

- dd.* Rump white; rich cinnamon-buff below, with darker rufous shaft-streaks.

*Circus hudsonius*, ♂ and ♂, juv.

- aa.* Under parts variously colored, but never uniform; always barred, streaked, or with strongly contrasting areas of color.

- b.* Tail two-thirds or more than two-thirds the length of wing.

- c.* Tarsi feathered to base of toes; an occipital crest.

- d.* Chest and breast nearly uniform black; thighs slightly barred with white. *Spizaëtus tyrannus*, ♂ and ♀, adult.
- dd.* Under parts strongly barred with black and white.
- e.* Feathers of crest black (except at extreme base).
- f.* Chest white, crown buff-white, mixed with black. *Spizaëtus ornatus*, juv.
- ff.* Sides of chest and sides of neck tawny; a black malar streak extending to breast, enclosing a pure white area; crown black, nape tawny-brown. *Spizaëtus ornatus*, adult.
- ee.* Feathers of crest white basally, tipped with black, crest shorter; chest black, rest below brownish-black, brokenly barred with white. *Spizaëtus tyrannus*, juv.
- cc.* Tarsi not wholly feathered.
- d.* Tail equal to wing in length, or longer, or else wing not exceeding it by more than length of hind toe with claw.
- e.* Size small (wing not over 170); wing exceeds tail by length of hind toe and claw; under parts more or less barred.
- f.* Under parts buff-ochraceous, more or less barred with black.
- g.* Only chest and upper breast brokenly barred. *Micrastur interstes*, juv.
- gg.* Entire lower parts coarsely barred. *Micrastur interstes*, immature.
- ff.* Under parts (except throat) finely and evenly barred with blackish and white. *Micrastur interstes*, adult.
- ee.* Size larger (wing not less than 250).
- f.* Tail a little longer than wing; buff-white below, coarsely barred with sooty-black.
- g.* A buff nuchal collar. *Micrastur brachypterus*, juv.
- gg.* No buff nuchal collar. *Micrastur mirandollei*, juv.
- ff.* Tail a little shorter than wing.
- g.* Buff-white below, with elongated tear-shaped spots of sooty-brown; grayish-sooty above, feathers largely edged with rufous. *Accipiter cooperi*, juv.
- gg.* White below, brokenly and irregularly barred with chestnut-rufous and with shaft-streaks of dusky; grayish-plumbeous above, crown black. *Accipiter cooperi*, adult.
- dd.* Tail at least two-thirds the length of wing.
- e.* Size large (wing 446 to 570); a pendant nuchal crest.
- f.* Chest black, breast and abdomen white; thighs barred with black (wing 570). *Thrasaëtus harpyia*.
- ff.* Chest brownish-gray, rest below buff-ochraceous, barred with chestnut-rufous (wing 446). *Morphnus guianensis*.
- ee.* Size smaller (wing not more than 350 mm.).

- \*  
*f.* Either upper or lower tail-coverts immaculate white or buff-white; under parts not barred, or else rump white or maxilla with two pronounced teeth.  
*g.* Maxilla with two teeth or else rump white.  
*h.* Maxilla with two teeth.  
*i.* Lower parts strongly barred with chestnut-rufous, whitish, and dusky-sooty; chest almost entirely chestnut; above sooty-slate, unmarked.  
*Harpagus fasciatus*, adult.  
*ii.* Upper parts brown, feathers edged with fulvous; only abdomen barred; chest streaked with brown.  
*Harpagus fasciatus*, juv.  
*hh.* Rump white; upper parts ashy-blue or sooty-bluish; chest dull bluish-gray; abdomen and thighs white, sparsely and brokenly barred with chestnut-rufous.  
*Circus hudsonius*, adult.  
*gg.* Maxilla with not more than one tooth; under tail-coverts white or buff-white.  
*h.* Upper parts black, with a metallic lustre, or else brown, barred with black or dusky.  
*i.* Upper parts and whole throat, breast, and tail black; abdomen white (wing 356).  
*Ibycter americanus*.  
*ii.* Upper parts brown, barred with black (wing 200).  
*j.* Centre of crown brown, surrounded by slaty-blue; secondaries largely slaty-blue; below buff-ochraceous; sides spotted with black.  
*Cerchneis sparveria phalæna*, adult.  
*jj.* No blue on upper parts; lower parts thickly streaked with brown.  
*Cerchneis sparveria phalæna*, juv.  
*hh.* Upper parts sooty-brown or slaty-blue.  
*i.* Upper parts sooty-brown or grayish-sooty; remiges and rectrices sooty-gray, barred with dusky; lower parts buff, heavily streaked with chestnut-brown.  
*Accipiter velox*, juv.  
*ii.* Upper parts slaty-blue; sides of neck rufous; under parts white, broadly barred with pale rufous. *Accipiter velox*, adult.  
*ff.* Neither upper nor lower tail-coverts immaculate; either barred or streaked.

- g. Lower parts (at least abdomen) more or less heavily barred.
- h. Upper parts mainly sooty-black.
  - i. Size large (wing 280 to 300).
    - j. Entire lower parts coarsely barred with dark chestnut-brown and white (or buffy). *Leptodon uncinatus*, juv.
    - jj. Forehead and lores mixed with white; lower parts blackish, barred with buff-white. *Leptodon uncinatus*, adult.
  - ii. Size small (wing not more than 145); entire lower parts finely barred with sooty-black and white (rufous and white in young). *Accipiter tinus*.
- hh. Upper parts sooty-gray or grayish-brown; concealed portion of remiges largely chestnut-rufous.
  - i. Chest dirty buff-gray, unmarked; upper parts unmarked; belly barred with rufous and buff. *Rupornis ruficauda*, adult.
  - ii. Entire lower parts buff-ochraceous, chest heavily streaked with dusky rufous; breast and abdomen brokenly barred with rufous. *Rupornis ruficauda*, juv.
- gg. Lower parts streaked or mottled but not barred.
  - h. Size larger (wing 290); blackish above, concealed white on nape; chest and throat black, broadly streaked with sooty-gray; abdomen whitish, heavily streaked and mottled with sooty-black; tail gray with two black bars. *Leptodon cayennensis*, juv.
  - hh. Smaller (wing 210); dark slate-color (adults) or sooty-brown (juv.) above; lower parts buff-ochraceous, more or less heavily streaked with dark brown (less in adult); under wing-coverts mottled with white and dark brown. *Falco columbarius*.
- bb. Tail always less than two-thirds the length of the wing.
- c. Tail never less than one-half the length of the wing.
- d. Under parts more or less extensively barred, not streaked (except sometimes on throat).
- e. Throat and upper chest buff-ochraceous, white or slaty-black, unmarked.
- f. Throat buffy or white, unmarked.
- g. Breast black, narrowly barred with white; belly and thighs chestnut (wing 190). *Falco rufigularis*.

- gg. Breast, abdomen and thighs chestnut (wing 235).  
*Falco deiroleucus.*
- ff. Throat and chest slaty-black, rest below grayish-white, finely barred with blackish; slaty above (wing 360).  
*Leucopternis princeps.*
- ee. Throat and upper chest either streaked or barred.  
 f. Upper parts bluish-gray, with faintly indicated bars of paler, entire under parts (except upper throat) finely barred with slaty gray and white.  
*Asturina plagiata*, adult.
- ff. Upper parts mainly sooty-brown, or brown.  
 g. Interscapular region and chest buff, barred with black; breast and thighs black; tail extensively white basally.  
*Polyborus cheriway.*
- gg. Interscapular region concolorous with back; breast, abdomen, and thighs buff-white, coarsely and brokenly barred with dark chestnut-rufous; chest heavily mottled with same. *Buteo platypterus.*
- dd. Under parts mottled or streaked but not barred (except sometimes on thighs).  
 e. Dorsal aspect of tail chestnut, or else chest dusky chestnut-rufous, with rest of lower parts mainly white (wing 380).  
 f. Tail chestnut; lower parts (except throat, white) buff-ochraceous, mottled with sooty-brown.  
*Buteo borealis costaricensis*, adult.
- ff. Chest brown, rest below white. *Buteo swainsoni*, adult.
- ee. Dorsal aspect of tail not chestnut or brown.  
 f. Under tail-coverts white or buff-ochraceous, unmarked, or else upper tail-coverts and base of tail whitish.  
 g. Upper tail-coverts and base of tail whitish; lower parts whitish, throat narrowly, and breast broadly, streaked with dark brown; flanks almost entirely brown.  
*Rostrhamus sociabilis*, juv.
- gg. Under tail-coverts white or buff-ochraceous.  
 h. Median portion of outer web of primaries cinnamon-ochraceous, barred with black, apical portion sooty-black; pileum and nape buff-white, streaked with sooty.  
*Asturina plagiata*, juv.
- hh. Whole outer web of primaries sooty-black.  
 i. Inner web of three outer primaries emarginate (wing, 400); lower parts but slightly mottled with dusky.  
*Buteo swainsoni*, juv.
- ii. Inner web of four outer primaries emarginate.  
 j. Smaller (wing, 280); buff below, sides of chest and throat streaked, abdo-

- men and thighs spotted with sooty-brown. *Buteo platypterus*, juv.
- jj. Larger (wing, 400); throat and abdomen streaked, breast unmarked; thighs brokenly barred.
- Buteo borealis costaricensis*, juv.
- ff. Under tail-coverts streaked or barred.
- g. Tarsi shorter (75 to 90).
- h. Tail (dorsal view) sooty-brown, with indistinct bars of darker sooty; under parts heavily obscured with sooty-brown (tarsi, 75).
- Buteo swainsoni*, juv.
- hh. Tail buff-white, with about six black bars (tarsi, 90); deep ochraceous below, streaked with black, thighs barred with black.
- Urubitinga anthracina*, juv.
- gg. Tarsi longer (110 mm.); under parts deep ochre, streaked and spotted with dark brown; upper tail-coverts buff.
- h. Markings on breast heavier.
- Urubitinga urubitinga ridgwayi*, juv.
- hh. Markings on chest narrower.
- Urubitinga urubitinga*, juv.
- cc. Tail less than one-half the length of wing.
- d. More than half of basal portion of tail white or grayish-white (ventral surface).
- e. Shoulders and tertials largely chestnut-brown; lower parts white, finely barred on abdomen and thighs with dark rufous.
- Buteo albicaudatus sennetti*, adult.
- ee. Shoulders and tertials not chestnut-brown; inner wing-coverts white, strongly barred with dark brown; lower parts white, coarsely and brokenly barred on abdomen and thighs or else nearly entire lower parts obscured by sooty-brown or blackish.
- Buteo albicaudatus sennetti*, juv.
- dd. Tail not largely white or grayish-white.
- e. Nearly entire upper and lower parts chestnut-brown; primaries, secondaries, and rectrices black; a patch of black on lower throat (young with dark spots and streaks on abdomen).
- Busarellus nigricollis*.
- ee. Slaty-black above, feathers narrowly margined with whitish; below whitish, broadly streaked with slaty-black.
- Ictinia plumbea*, juv.

#### 124. *Polyborus cheriway* (Jacquin).

*Falco cheriway* JACQUIN, Beitrag, 1784, 17, t. 4.

*Polyborus cheriway* CABANIS, in Schomb. Reis. Guiana, III, 741. — SHARPE, Cat.

Birds Brit. Mus., I, 1874, 33. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887,

125 (Alajuela). — CHERRIE, Auk, VII, 1890, 333; IX, 1892, 328 (San José — rather rare, but resident). — UNDERWOOD, Ibis, 1896, 446 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 125 (references cited).

*Polyborus audubonii* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (San José [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 367 (C. R.).

C. H. Lankester Collection: Guanacaste.

This species inhabits the Pacific slope and the peninsula of Nicoya, north to Nicaragua, but does not extend south of the Gulf of Nicoya. It is most abundant in Guanacaste, and even there it is few in numbers, associating with the vultures. They seem very tame, for near Puntarenas beside the railroad-track I noticed one which remained perching while the train passed by.

### 125. *Ibycter americanus* (Boddaert).

(Native name "Gavelon de Cacao.")

*Falco americanus* BODDAERT, Tabl. Plan. Enl., 1783, p. 25.

*Ibycter americanus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (San José [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 367 (Guaitil and Guanacaste). — SHARIE, Cat. Birds Brit. Mus., I, 1874, 35. — RIDGWAY, Bull. U. S. Geol. & Geogr. Surv., I, 470 (San José [M. Calleja], Talamanca [Gabb]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (Jiménez, Tacares de Alajuela, Pózo Azul de Pirris). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893 (Térraba Valley — seen but not collected). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 128 (references cited).

U. S. Nat. Museum: Bonilla (Ridgway) (Basulto).

Bangs Collection: Pózo Azul de Pirris (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Pózo Azul de Pirris and El Hogar (Carriker).

Two skins.

An inhabitant of the forests of the lowlands of both the Pacific and Caribbean. It is never abundant, is invariably seen in pairs, and is very noisy. It frequently utters its peculiar cry, especially when alarmed or disturbed, which resembles much the word "ca-ca-o," so much so indeed that the natives have named it "Gavelon de Cacao." I have never seen the bird on the ground, but often in low trees in the forest, and I imagine its food consists largely of tree-lizards and small snakes.

### 126. *Circus hudsonius* (Linnæus).

*Falco hudsonius* LINNÆUS, Syst. Nat., ed. 12, I, 1776, 128.

*Circus hudsonius* VIEILLOT, Ois. Am. Sept., I, 1807, pl. 9. — LAWRENCE, Ann.

Lyc. N. Y., IX, 1868, 134 (San José [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 370 (Candelaria Mts.). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 55. — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 50 (Buenos Aires — common from Nov. to Jan.); Auk, VII, 1890, 333; IX, 1892, 328 (San José — tolerably common from Oct. 1 to Feb. 28). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1899, 43 (references cited).

Bangs Collection: Bolson, Cartago, Azahar de Cartago (Underwood).  
C. H. Lankester Collection: Turrúcares.

A common winter resident over the higher parts of the country and the region of the plains of northwestern and southwestern Costa Rica. I never saw it on the Caribbean lowlands, for the reason, I suppose, that there are few or no suitable conditions for it. I saw a pair in October flying about the marsh at El Alto (Ochomogo).

### 127. *Micrastur brachypterus* (Temminck).

*Falco brachypterus* TEMMINCK, Pl. Col., I, 1822, Pls. 116, 142.

*Micrastur semitorquatus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (Las Cruces de Candelaria, Rancho Redondo [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 369 (C. R.). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 75. — BOUCARD, P. Z. S., 1878, 44 (La Candelaria).

*Micrastur melanoleucus* RIDGWAY, Proc. Phil. Acad. Nat. Sci., 1875, 484 (San José and Angostura [J. Carmiol], Rancho Redondo [Frantzius], Sipurio [Gabb]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (C. R.). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 50 (Buenos Aires). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 107 (Irazú, Sibahue, Bebedero [Underwood]).

Bangs Collection: Bolson and Carrillo (Underwood).

Dr. Richmond informs me that the now accepted name for this species is that here used, that *Sparverius semitorquatus* Vieillot, does not refer to this bird, nor does *melanoleucus*.

This *Micrastur* seems to be sparingly distributed over nearly the whole of Costa Rica, up to 6,000 or 7,000 feet. In spite of the fact that it has such a wide range it is not a common bird anywhere, while its habitat renders it more difficult to find and collect than most hawks. It keeps entirely within the forest, and like all of the genus is to be found low down.

### 128. *Micrastur mirandollei* (Schlegel).

*Astur mirandollei* SCHLEGEL, Nederl. Tijdschr., I, 1863, 131.

*Micrastur mirandollei* SCLATER and SALVIN, P. Z. S., 1867, 759. — SHARPE, Cat. Birds Brit. Mus., I, 1874, 76. — RIDGWAY, Proc. Acad. Nat. Sci. Phila., 1875, 485 (Talamanca [Gabb]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 109 (Costa Rica and Panama).



The only record for the taking of this rare hawk in Costa Rica is that published by Mr. Ridgway (Talamanca [Gabb]). This bird was evidently taken in the vicinity of Sipurio, for Professor Gabb did most of his work there. Nothing is known of its habits or Central American range, beyond the fact that this one specimen was taken in Talamanca and two are recorded from Panama. It is evidently only a rare straggler in this region and does not properly belong to the avifauna of Costa Rica.

**129. *Micrastur interstes* Bangs.**

*Micrastur guerilla* SHARPE, Cat. Birds Brit. Mus., I, 1874, 79. *part.* — RIDGWAY, Proc. Acad. Nat. Sci. Phila., 1875, 488, *part* (C. R. [Frantzius and Gabb]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (Monte Redondo). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 50 (Boruca). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 110, *part* (Estrella, Jiménez, Irazú, Talamanca, Pózo del Pital, Carrillo [Underwood]).

*Micrastur interstes* BANGS, Auk, XXIV, 1907, 289 (La Estrella de Cartago and El Pózo de Térraba [Underwood]).

Bangs Collection: Tenorio (Underwood).

C. H. Lankester Collection: Tuís.

Carnegie Museum: Pózo Azul de Pirrís, Carrillo, Buenos Aires (Carriker). Three skins.

Like its larger relative, this handsome little hawk is well distributed over the whole of the country, up to at least 5,000 feet. It is more abundant in the lowlands of the Pacific than in any other portion of Costa Rica, and like all the genus it is strictly an inhabitant of forests, keeping near the ground in the low trees, vines, and shrubbery. Its food consists largely of small birds. As a rule it is quite fearless, and is much easier to approach than most woodland birds. I once watched one of these hawks make an attack on a small covey of partridges (*Odontophorus melanoleucus*). The partridges fled in every direction in the utmost confusion, and while the hawk did not succeed in killing his quarry he at least relieved the bird of a large portion of its feathers. I was so interested in the outcome of the battle that both hawk and partridges made their escape.

**130. *Geranospizias niger* (Du Bus).**

*Ischnosceles niger* DU BUS, Bull. Ac. Brux., XIV, 1847, p. 1021.

*Geranospizias niger* SHARPE, Cat. Birds Brit. Mus., I, 1874, 82 (Central America). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 127 (Pózo Azul de Pirrís). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1899, 52 (Zeledón's references). — BANGS, Auk, XXIV, 1907, 290 (El Pózo de Térraba [Underwood]).

Bangs Collection : Bolson and Tenorio (Underwood).

C. H. Lankester Collection : Guanacaste.

Carnegie Museum : Bebedéro (Carriker). One skin.

I believe this bird to be confined to the Pacific lowlands of Costa Rica, for in all my collecting on the eastern slope I have never seen it, nor are there any records for that side. It is of a very sluggish nature and apparently feeds on frogs and lizards, for it is always found in the vicinity of water, usually a sluggish lagoon or pond. In its habits it somewhat resembles *Urubitinga*, but is still more sluggish.

### 131. *Parabuteo unicinctus harrisi* (Audubon).

*Falco harrisii* AUDUBON, Birds Amer., t. 392; Orn. Biogr., V, 30.

*Erythrocnema unicincta*, part (nec Temminck) SHARPE, Cat. Birds Brit. Mus., I, 1874, 85.

*Parabuteo unicinctus harrisi* RIDGWAY, in Baird, Brewer and Ridgway, N. Amer. Birds, III, 250. — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 328 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (San José). — CHERRIE, Auk, IX, 1892, 328 (San José — a skin in Museum labelled San José). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1899, 56.

*Buteo harrisi* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1899, 56 (references cited).

C. H. Lankester Collection : Palo Verde de Guanacaste.

A very rare bird in Costa Rica, but doubtless a resident. Mr. Lankester's bird was taken about May 5-10. I saw a bird on the edge of the lagoon at the mouth of the Matina River in November, but was unable to secure it. Mr. Nutting says that this bird is an inveterate chicken-thief and associates with vultures, eating carrion.

### 132. *Accipiter cooperi* (Bonaparte).

*Falco cooperii* BONAPARTE, Am. Orn., II, 1828, I, pl. x, fig. 1.

*Accipiter cooperii* GRAY, List B. Brit. Mus. Accipitres, 1844, 38. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (El Mojón [J. Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 359 (C. R.). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 137. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1899, 46 (C. R. [J. Carmiol]).

*Nisus cooperi* RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., I, 1876, 103 (El Mojón [Cooper]).

A rare winter visitant, probably only to be found in the highlands.

### 133. *Accipiter tinus* (Latham).

*Falco tinus* LATHAM, Ind. Orn., p. 50.

*Accipiter tinus* GRAY, Gen. Birds, I, 29, t. 10. — SHARPE, Cat. Birds Brit. Mus., I, 1874, 139. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1899, 51 (Nicaragua and Panama).

Bangs Collection: Carrillo, May 13, 1907, ♂ juv. (Underwood).

Carnegie Museum: Guápiles, March 10, 1903, ♂ ad.; El Hogar, Dec., 1905, ♀, March, 1907, ♂ (Carriker).

The present species is one of the rarest of the Central American hawks, but three specimens being known from Central America previous to the taking of those recorded above, two from Panama and one from Greytown, Nicaragua (A. Alfaro), the latter being in the Museo Nacional de Costa Rica. This specimen was reported by Mr. Cherrie (Proc. U. S. Nat. Mus., XIV, 1891, 537). It seems to be restricted to the northeastern parts of Costa Rica, for although I always hunted for it in other places I never saw it outside of that region. It is an inhabitant of the dense forest, with habits very similar to those of *Micrastur interstes*. The male taken at El Hogar in March, 1907, was eating a freshly killed ant-thrush (*Ramphocænus semitorquatus*), and allowed me to approach within thirty feet of it without showing signs of fright or ceasing to feed on its prey.

#### 134. *Accipiter velox* (Wilson).

*Falco velox* WILSON, Am. Orn., V, 1812, 116, pl. 45, fig. 1.

*Accipiter velox* VIGORS, Zool. Jour., I, 1824, 338.—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126.—CHERRIE, Auk, IX, 1892, 328 (San José, Jan. 8, 1884).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1899, 48 (San José [Carmiol]).

*Accipiter fuscus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (El Mojón [Zeledón]).—FRANTZIUS, Jour. für Orn., 1869, 369 (C. R.).—SHARPE, Cat. Birds Brit. Mus., I, 1874, 135.

*Nisus fuscus* RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., I, 1876, 115 (El Mojón, Dec., 1867 [Frantzius]).

U. S. Nat. Mus.: Guayábo, March, 1908 (Ridgway and Zeledón).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Bangs Collection: Volcan de Irazú, Nov. 27, Escazú, Nov. 29 (Underwood).

A winter visitor, occurring in small numbers over the higher portions of the country.

#### 135. *Accipiter bicolor schistochlamys* Hellmayr.

*Accipiter bicolor* SCLATER and SALVIN, Exotic. Orn., 1868, 137, 170, Pl. 69.—SHARPE, Cat. Birds Brit. Mus., I, 1874, 154, *part.*—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (San José).—CHERRIE, Auk, IX, 1892, 328 (San José).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1899, 47 (Miravalles [Underwood], Turrialba [Arcé]).

*Accipiter pileatus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (San José [J. Carmiol], Dota [F. Carmiol], Turrialba [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 369 (C. R.).

*Nisus bicolor* RIDGWAY, Bull. U. S. Geogr. and Geol. Surv., I, 1876, 108 (San José [Carmiol], Turrialba [Cooper]).

*Accipiter bicolor schistochlamys* HELLMAYR, Bull. Brit. Orn. Club, XVI, 1906, 823 (Ecuador to Chiriquí). — BANGS, Auk, XXIV, 1907, 290 (El Pózo and Boruca [Underwood]).

U. S. Nat. Museum: Santa Maria de Dota (Basulto).

Bangs Collection: Pózo Azul de Pirrís (Underwood).

Carnegie Museum: El Hogar, Boruca, and Buenos Aires (Carriker).  
Three skins.

Fairly common over the lowlands of both the Caribbean and Pacific and extending upward over the highlands, in less numbers, to an elevation of perhaps 4,000 feet. Its habits are more like the North American species of the genus, since it keeps more to the open woodland, isolated thickets, and second-growth scrub. They prey largely upon birds. The specimen shot at El Hogar was feeding upon a freshly killed cuckoo (*Crotophaga sulcirostris*).

### 136. *Buteo albicaudatus sennetti* Allen.

*Tachytriorchis albicaudatus* SHARPE, Cat. Birds Brit. Mus., I, 1874, 162.

*Buteo erythronotus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 133 (San José [J. Carmiol], San Antonio [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 210 and 368 (C. R.).

*Buteo albicaudatus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (C. R.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 58 (references cited).

*Buteo albicaudatus sennetti* ALLEN, Bull. Am. Mus. Nat. Hist., V, 144 (Central America and southern Texas).

Bangs Collection: San José and Cerro de Santa Maria (Underwood).

C. H. Lankester Collection: Laguna de Ochomogo.

The White-tailed Buzzard is a rare bird in Costa Rica, but few specimens having been recorded from that country. It appears to be a resident of the higher portions of the country, but in small numbers. It is much more abundant further north, especially in Mexico.

### 137. *Buteo abbreviatus* Cabanis.

*Buteo abbreviatus* CABANIS, in Schomb. Reise Brit. Guiana, III, 1848, 739. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 59 (San Lucas [Underwood]).

*Buteo fuliginosus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 133 (La Palma [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 368 (San Antonio [Zeledón]).

*Tachytiorchis abbreviatus* SHARPE, Cat. Birds Brit. Mus., I, 1874, 163.

A rare migrant, a few birds remaining scattered over the highlands, while the balance of the few that go further south than Mexico, drift on to Panama and South America.

### 138. *Buteo swainsoni* Bonaparte.

*Buteo swainsoni* BONAPARTE, Geog. & Comp. List, 1838, 3. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126. — CHERRIE, Auk, VII, 1890, 333; IX, 1892, 328 (seen occasionally from Nov. 1 to Feb. 25). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 68 (Tucurríqui [Arcé]).

*Buteo obsoletus* SHARPE, Cat. Birds Brit. Mus., I, 1874, 184.

*Buteo albonotatus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 133 (San José [J. Carmiol]).

Carnegie Museum: Volcan de Irazú (8000 ft.), ♀ & ♂, Apr. 4 and 16, 1902 (Carriker).

I never met with this species except during April, 1902, on the Volcan de Irazú, where they were quite numerous for about three weeks and then disappeared. I believe that they were migrating from some point further south and stopped on Irazú to rest and feed. During the early autumn of 1906 there passed over El Hogar at a great height, an enormous flock of hawks, which I think were of this species, but they were too high to be certain of the identification. As nearly as I could estimate, there appeared to be at least a thousand of them. They came from the northwest, moving slowly in great circles, and after perhaps half an hour disappeared toward the south-east.

### 139. *Buteo borealis costaricensis* Ridgway.

*Buteo borealis*, var. *costaricensis* RIDGWAY, Baird, Brewer, and Ridgway, Hist. N. Amer. Birds, III, 1874, 285 (Costa Rica [Frantzius]).

*Buteo borealis costaricensis* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 404 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (Cartago and Santa Maria de Dota).

*Buteo borealis*, var. *montanus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 133 (San José [J. Carmiol], Los Tabacales [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 368 (C. R.).

*Buteo borealis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 61 (Cartago, San Isidro, Dota).

*Buteo montanus* (nec Nutt.) CABANIS, Jour. für Orn., 1869, 210 (C. R.). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 189 (San José [Van Patten]).

U. S. Nat. Museum : San Lucas de Dota (Basulto).

Bangs Collection : Azahar de Cartago (Underwood).

Although there are quite a number of records for the taking of this bird in Costa Rica, I do not believe it to be very abundant. It is restricted to the higher parts of the central plateau and the high mountains. I saw a fine adult bird on the Volcan de Turrialba in October, 1907, but was unable to secure it.

140. **Buteo platypterus platypterus** (Vieillot).

*Sparverius platypterus* VIEILLOT, Encycl. Method. Ornithol., III, 1823, 1273.

*Buteo latissimus* SHARPE, Cat. Birds Brit. Mus., I, 1874, 193.—BOUCARD, P. Z. S., 1878, 44 (San José, January). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (Jiménez).—CHERRIE, Auk, VII, 1890, 333; IX, 1892, 328 (San José, from the last of Nov. to May 1). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 69 (Carrillo and Barba [Underwood], San Lucas and Talamanca [Mus. Nac. de C. R.]).

*Buteo Pennsylvanicus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868 (San José [J. Carmiol], Angostura [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 368 (San José).

U. S. Nat. Museum : Guayábo (Ridgway and Zeledón).

Bangs Collection : Azahar de Cartago (Underwood).

Fleming Collection : Carrillo and Escazú (Underwood).

C. H. Lankester Collection : Cariblanco de Sarapiquí.

Carnegie Museum : Guápiles, El Hogar, Tucurríqui (Carriker).

Four skins.

The most abundant and widely spread of the migrant species of hawks in Costa Rica, being found in the lowlands of both the Caribbean and Pacific, and over the central plateau region. It seems quite partial to trees along the edges of streams and isolated patches of woodland.

141. **Buteo brachyurus** Vieillot.

*Buteo brachyurus* VIEILLOT, Nouv. Dict. d'Hist. Nat., IV, 1816, 477.—CHERRIE, Auk, IX, 1892, 328 (San José, Sept. 10, 1888 [Alfaro]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 71 (Irazú [Underwood], San Antonio [Frantzius], La Palma [Zeledón and Frantzius]).

*Buteola brachyura* SHARPE, Cat. Birds Brit. Mus., I, 1874, 201.

*Buteo fuliginosus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (C. R.).

Bangs Collection : Azahar de Cartago (Underwood).

A rare species in Costa Rica and confined to the higher portions of the plateau region, as far as can be determined by the records known. I do not know whether it is a resident there or only a winter visitor,

but it is probably the latter. The only dates I have for its collection in Costa Rica are August 30th and September 10th.

142. *Asturina nitida* (Latham).

*Falco nitidus* LATHAM, Ind. Orn., I, 1790, 41; Temm. Pl. Col., I, 1824, tt. 87, 294.

*Asturina nitida* SHARPE, Cat. Birds Brit. Mus., I, 1874, 203 (South America). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 73 (Panama and S. A.). — BANGS, Auk, XXIV, 1907, 290 (El Pózo de Térraba, April 3, 1906, ♂ [Underwood]).

The specimen recorded by Mr. Bangs from El Pózo is an adult male, typical of the species, and agrees exactly with birds from Panama. It is undoubtedly the only record for the taking of *A. nitida* so far north and is a very unusual occurrence.

143. *Asturina plagiata* Schlegel.

*Asturina plagiata* SCHLEGEL, Mus. Pays-Bas, Asturinæ, p. 1. — SCLATER and SALVIN, Exotic Orn., 179, Pl. 90; P. Z. S., 1869, 130 (La Barranca [Arcé]). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 204. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (San Mateo). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 74 (references cited). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 403 (La Palma de Nicoya).

*Asturina nitida* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (Gulf of Nicoya [Coll. Salvin]). — FRANTZIUS, Jour. für Orn., 1869, 369 (C. R.).

*Asturina polionota* CABANIS, Journ. für Orn., 1869, 208 (C. R. [Ellendorf]).

U. S. Nat. Museum: Santo Domingo (Ridgway).

Bangs Collection: Bolson (Underwood).

C. H. Lankester Collection: Bebedéro.

The Goshawk in Costa Rica seems to be confined entirely to the shores and slopes of the Gulf of Nicoya, all the specimens recorded having been taken either on the mainland east of the Gulf (Barranca and San Mateo) or in the valley of the Tempisque River. I am quite certain the bird does not occur on the Carribbean slope, or I should have seen it there at some time.

144. *Rupornis ruficauda* (Sclater and Salvin).

*Asturina magnirostris* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (Juan [Frantzius], San José and Turrialba [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 369 (C. R.).

*Asturina ruficauda* SCLATER and SALVIN, P. Z. S., 1869, 133 (Veragua); Exotic Orn., 1868, Pl. 88. — SHARPE, Cat. Birds Brit. Mus., I, 1874 (Chiriquí and Panama).

*Rupornis ruficauda* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 403 (La Palma

de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 126 (Liberia, San Mateo and La Palma de San José). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 51 (Boruca and Buenos Aires); Auk, IX, 1892, 328 (San José; not common, but more so at lower altitudes). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 76 (San Lucas, Irazú, Alajuela, San Isidro, Santa Ana, Talamanca, Guaitil, Bebedéro, Miravalles [Underwood]). — BANGS, Auk, XXIV, 1907, 290 (Boruca and El Pózo [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Pígres and Bonilla (Ridgway).

Bangs Collection: Bolson, Cerro de Santa Maria, Tenorio, El General de Térraba (Underwood).

Carnegie Museum: Pózo Azul, La Hondura, Bebedéro, Miravalles; El Pózo, Boruca, and Buenos Aires de Térraba (Carriker). Eleven skins.

By far the commonest hawk in Costa Rica, although not abundant over the whole of the country. It is rare in the Caribbean lowlands, I never having seen but one bird at low altitude (Guápiles), but a little higher up it is commoner. It is also sparsely scattered over the lower portion of the highlands, becoming more abundant on the Pacific slope and reaches its maximum abundance in southwestern Costa Rica, in the Térraba Valley, where it is even commoner than around the Gulf of Nicoya. It is usually met with along streams, although not confined to such localities. It is quite fearless and feeds largely on lizards.

#### 145. *Busarellus nigricollis* (Latham).

*Falco nigricollis* LATHAM, Ind. Orn., I, 1790, 30.

*Busarellus nigricollis* SHARPE, Cat. Birds Brit. Mus., I, 1874, 211. — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 404 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (Las Trojas and Liberia). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 85.

Bangs Collection: Bolson (Underwood).

Apparently a rare bird in Costa Rica, and thus far recorded only from the shores of the Gulf of Nicoya and Guanacaste. Nutting reports it abundant around La Palma, but it certainly is not common farther north, for neither Underwood, Lankester, nor myself took it in the Tempisque River region (excepting the single bird taken by Underwood at Bolson).



146. *Urubitinga urubitinga* (Gmelin).

*Falco urubitinga* GMELIN, Syst. Nat., I, 1788, 265.

*Urubitinga zonura* SHARPE, Cat. Birds Brit. Mus., I, 1874, 213, *part.* — SALVIN and GODMAN, Biol. Centr.-Am., Aves, 1901, III, 79 (Bebedéro [Arcé]).

*Urubitinga urubitinga* SHARPE, Hand List of Birds, I, 1899, 258.

I have never collected or seen a bird of this species from Costa Rica, and I have no doubt that it is only an occasional straggler so far north, its occurrence being similar to that of *Asturina nitida* as recorded by Mr. Bangs. The only authentic record existing which can be used for proof of its ever having been taken in Costa Rica is the single specimen taken by Arcé at Bebedéro, as recorded by Salvin and Godman (*Biologia*), from which the description of the species for the *Biologia* was made. All other records for *Urubitinga urubitinga*, which can be relied upon, were published prior to the description of *U. u. ridgwayi* by Gurney in 1884, and hence were naturally placed under the only existing species at that time. I do not believe that Costa Rica lies within the true range of the present species, and unless there be absolute proof to the contrary, all specimens of *Urubitinga urubitinga* from that country should be placed under the following subspecies.

147. *Urubitinga urubitinga ridgwayi* (Gurney).

*Urubitinga zonura* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 133 (San José [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 368 (Aguacate). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 213, *part.* — RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., II, 1876, 168, *part.* (San José [J. Carmiol], Sipurio [Gabb]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 404 (La Palma de Nicoya).

*Urubitinga ridgwayi* GURNEY, Diur. Birds Prey, 1884, pp. 77, 148.

*Urubitinga urubitinga ridgwayi* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (San Mateo, San José). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 51 (Punta Mala and Laguna de Sierepe-Térraba); Auk, IX, 1892, 328 (San José — rare straggler). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 521 (Rio Frio). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 79 (Pózo Azul and Miravalles [Underwood]).

Bangs Collection: La Vijagua, Cerro de Santa Maria, El General de Térraba (Underwood).

Carnegie Museum: Guácimo, El Hogar, Bebedéro (Carriker). Three skins.

A fairly common species in the lowlands of both the Caribbean and Pacific slopes, extending up over the central plateau in small numbers.

It is perhaps most numerous along the beach and the edges of rivers, seeming to feed extensively on frogs and small crustacea. It is of a very sluggish nature, and not at all shy, being very easy to approach. I have even seen them when shot at and not hit, sit calmly as before, only turning the head quickly to find the cause of the disturbance.

148. **Urubitinga anthracina** (Lichtenstein).

*Falco anthracinus* LICHTENSTEIN, Preis. Verz. Mex. Vog., 1830, 3.

*Urubitinga anthracina* SCLATER, P. Z. S., 1858, 295. — SCLATER and SALVIN, Ibis, 1859, 216 (Puntarenas [Salvin]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 143 (San José [Frantzius], Angostura [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 368 (C. R.). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 215. — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 404 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (Jiménez, Pózo Azul de Pirris, Talamanca). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 51 (Palmar); Auk, IX, 1892, 328 (San José — not common). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 521 (Rio Frio). — RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., I, 1876, 171 (Puntarenas [Salvin], San José [Frantzius], Angostura, [F. Carmiol], Talamanca [Gabb]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 81 (Miravalles [Arcé & Underwood]).

U. S. Nat. Museum : Guayábo and Pígres (Ridgway and Zeledón).

Bangs Collection : San José, Cerro de Santa Maria, Bolson (Underwood).

C. H. Lankester Collection : Guácimo.

Carnegie Museum : Guácimo and El Hogar (Carriker). Two skins.

The range and habits of the present species agree almost exactly with those of the preceding.

149. **Leucopternis ghiesbreghti** (Du Bus).

*Buteo ghiesbreghti* DU BUS, Esquisses Orn., 1845, t. I.

*Pæcilopternis ghiesbreghti* FRANTZIUS, Jour. für Orn., 1869, 368 (Candelaria Mts.).

*Leucopternis ghiesbreghti* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (Jiménez). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 82 (Reventazón and Carrillo [Underwood]).

*Urubitinga ghiesbreghti* SHARPE, Cat. Birds Brit. Mus., I, 1874, 217. — BOUCARD, P. Z. S., 1878, 44 (Juan Viñas).

U. S. Nat. Museum : Bonilla (Basulto) (Ridgway).

Bangs Collection : La Vijagua, Tenorio (Underwood).

C. H. Lankester Collection : Guácimo.

Carnegie Museum : Guápiles, El Hogar, Miravalles (Carriker). Six skins.

This beautiful hawk is fairly common throughout the Caribbean lowlands, more so in the northern part, from which it spreads northwestward to the northern part of Guanacaste in small numbers. It has also been taken in the Candelaria Mountains (Frantzius), but I think this record doubtful, as it is quite out of the range of the bird. It is decidedly an inhabitant of the more humid portion of the eastern lowlands, although existing in smaller numbers elsewhere. It is not found outside of the forests. Its favorite perch is on the top of some giant of the forest, where it is very conspicuous by reason of its white color, but quite safe from any weapon but a rifle.

**150. *Leucopternis semiplumbea* Lawrence.**

*Leucopternis semiplumbea* LAWRENCE, Ann. Lyc. N. Y., VII, 1861, 288 (Panama); IX, 1868, 133 (Valsa [J. Carmiol]). — SCLATER and SALVIN, Exotic Orn., 1868, Pl. 61. — FRANTZIUS, Jour. für Orn., 1869, 368 (C. R.). — RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., 1876, I, 178 (Valsa [J. Carmiol], Talamanca and Old Harbor [Gabb]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (Talamanca). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 84 (references cited).

*Urubitinga semiplumbea* SHARPE, Cat. Birds Brit. Mus., I, 1874, 220 (Panama and Costa Rica).

C. H. Lankester Collection: Guácimo and Cariblanco de Sarapiquí.  
Carnegie Museum: Rio Sicsola, Guácimo, El Hogar (Carriker).  
Four skins.

This species ranges over the whole of the Caribbean lowlands from Panama to Nicaragua, up to an elevation of probably not more than 1,200 feet. It is strictly an inhabitant of the forests, never going beyond the margin of the dense jungle peculiar to its range, nor have I ever seen it fly above the tree-tops. As a rule they are to be seen perched on a limb at no great height from the ground, and, sitting perfectly still, will permit themselves to be approached quite closely before flying.

**151. *Leucopternis princeps* Sclater.**

*Leucopternis princeps* SCLATER, P. Z. S., 1865, 429 (Tucurríqui [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 133 (Tucurríqui [Arcé]). — FRANTZIUS, Jour. für Orn., 1869, 368 (C. R.). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 415 (Van Patten Coll. — three specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 83 (references).

*Urubitinga princeps* SHARPE, Cat. Birds Brit. Mus., I, 1874, 220.

C. H. Lankester Collection: Cariblanco de Sarapiquí.  
Carnegie Museum: La Hondura (Carriker). One skin.

I secured but one specimen of this magnificent bird, at La Hondura, on the Caribbean slope at an altitude of about 4,000 feet. It was killed in the heavy forest and no others were seen. I think there are not more than six specimens of this rare hawk in existence, all having been taken in Costa Rica, one at Tucurríqui (Arcé), one at Cariblanco (Lankester), three (locality unknown—Van Patten Coll.), and my bird from La Hondura.

152. **Morphnus guianensis** (Daudin).

*Falco guianensis* DAUDIN, Traité, II, 1800, 78.

*Morphnus guianensis* CASSIN, Proc. Acad. Nat. Sci. Phila., 1860, 132. — SHARPE, Cat. Birds Brit. Mus., I, 1874, 222. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 88 (Panama). — BANGS, Bull. Mus. Comp. Zool., XXXIX, 1903, 142 (Honduras). — CARRIKER, Ann. Carnegie Mus., IV, 1908, 302 (Cuábre, Talamanca).

When I published my record for the taking of this species in Costa Rica, I stated that it was the first record north of Panama, having overlooked Mr. Bangs' record for Honduras, whence he obtained a single specimen. The bird I took March 21st, 1904, was, however, the first and I believe only record for Costa Rica. The bird was shot in the heavy forest near the Sicsola River.

153. **Thrasaëtus harpyia** (Linnæus).

*Vultur harpyia* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 121.

*Thrasaëtus harpyia* FRANTZIUS, Jour. für Orn., 1869, 368 (Cartago and Turrialba). — SHARPE, Cat. Birds Brit. Mus., 1874, 224. — BOUCARD, P. Z. S., 1878, 44 (Candelaria Mts.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126. — CHERRIE, Auk, IX, 1892, 328 (reference to Frantzius' record for San José). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 89 (references cited).

*Harpyia destructor* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 145 (San José [M. Calleja]).

Carnegie Museum: El Hogar, Nov. 24, 1906, ♂ ad. (Carriker).

It is very probable that the range of this magnificent eagle does not extend to the Pacific slope, and that it prefers the dense forests and more humid climate of the Caribbean. Several specimens have been taken at rather high altitudes on the eastern side of the plateau region, but I am inclined to think it rather more abundant in the lowlands. The specimen taken at El Hogar was shot on the edge of a new clearing, and when first seen was on the ground, eating a young sloth which it had just killed. Another fine male was killed by a surveying party

at El Hogar a short time previously. This specimen I prepared for a friend.

154. *Spiziastur melanoleucus* (Vieillot).

*Buteo melanoleucus* VIEILLOT, Nouv. Dict. d'Hist. Nat., IV, 1816, 482.

*Spizaëtus melanoleucus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (La Palma [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 368 (San José, Esparta, Pacuare).

*Spiziastur melanoleucus* SHARPE, Cat. Birds Brit. Mus., I, 1874, 258. — RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., 1876, 166 (La Palma [Zeledón]). ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 94 (Tucurríqui [Arcé]).

Carnegie Museum: El Hogar and Buenos Aires de Terraba (Carriker).

Two skins.

This beautiful species is evidently sparingly distributed over nearly the whole of Costa Rica, excepting the higher portions of the mountains. It frequents the more open woodland, soars a great deal, and likes to perch on the very top of tall trees, like *Leucopternis ghiesbreghti*, for which it might easily be mistaken if the back were not visible.

155. *Spizaëtus ornatus* (Daudin).

*Falco ornatus* DAUDIN, Traité, II, 1800, 77.

*Spizaëtus ornatus* SCLATER, P. Z. S., 1857, 201. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (San José [J. Carmiol], La Palma and Juan [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 367 (Orósi). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 404 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (San José). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 51 (Boruca); Auk, IX, 1892, 328 (San José, occasionally met with). — UNDERWOOD, Ibis, 1896, 446 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 92 (San Isidro, San Vicente, Jiménez (Underwood)).

*Spizaëtus mauduyti* SHARPE, Cat. Birds Brit. Mus., I, 1874, 262.

C. H. Lankester Collection: Guanacaste.

Carnegie Museum: El Pózo de Terraba (Carriker). One skin.

Although there is a record of the taking of this species at Jiménez, in the Caribbean lowlands, I believe it to be merely a straggler on that side, and that its true range in Costa Rica covers only the central plateau region and the Pacific slope to the coast, including Guanacaste. It is much more abundant than the other representative of the genus in Costa Rica (*S. tyrannus*), but yet is not by any means a common bird, for in all my collecting I saw only two individuals. It is Buteo-like in its habits and manner of flight, and perches in large trees in conspicuous places as do the Buteos.

156. *Spizaëtus tyrannus* (Neuwied).

*Falco tyrannus* NEUWIED, Reise n. Bras., I, 1820, 360; Temm. Pl. Col., 73.  
*Spizaëtus tyrannus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (Tucurriquí [Arcé, Coll. O. Salvin]). — FRANTZIUS, Jour. für Orn., 1869, 368 (C. R.). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 264. — ZELEDÓN, An Mus. Nac. de C. R., I, 1887, 126. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 93 (San José [Underwood]).

Field Museum: Juan Viñas (Carriker).

Carnegie Museum: Boruca (Carriker). One skin.

The present species occupies about the same range as the preceding, but is a much rarer bird, very few specimens of it having been taken in Costa Rica. I secured one specimen at Juan Viñas and one at Boruca, both being shot in rather open woodland. Both birds were quite low down in the trees, and did not seem very shy.

157. *Herpetotheres cachinnans* (Linnæus).

(Native name "Guáco.")

*Falco cachinnans* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 128.  
*Herpetotheres cachinnans* VIEILLOT, Nouv. Dict. d'Hist. Nat., XVIII, 1817, 317. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (C. R. [Frantzus]). — FRANTZIUS, Jour. für Orn., 1869, 367 (C. R.). — RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., 1876, I, 138 (Talamanca [Gabb]). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 278. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 112 (Bebedéro and Miravalles [Underwood]).

Carnegie Museum: Guácimo, Rio Sicsola, El Hogar (Carriker). Three skins.

Distributed over both the Caribbean and Pacific lowlands, but does not get very high, not more than to 2,000 feet. They frequent almost entirely the forests or wooded pastures, and are always more abundant in districts where snakes are plentiful, for their food consists almost entirely of these reptiles. They have a very peculiar loud cry, which they often utter just before dusk for ten or fifteen minutes with scarcely an intermission. They begin with a call resembling "guá-co" (gwă'-co), slowly at first, with quite a noticeable interval between the two syllables. Gradually the notes increase in rapidity of utterance, while the interval between the two syllables decreases, until the call becomes merely a rapid repetition of "guas,guas." In Costa Rica the natives call the bird "Guáco" and in Nicaragua "Guas."

158. *Elanoides forficatus* (Linnæus).

(Native name "Tijereta.")

*Falco forficatus* LINNÆUS, Syst. Nat., ed 10, I, 1758, 89.*Elanoides forficatus* COUES, Proc. Acad. Nat. Sci. Phila., 1875, 345. — RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., I, 1876, 182 (San José [Frantzius]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126.*Elanoides furcatus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (Birris [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 369 (Aguacate, Quebrada Honda, Cervantes). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 317. — BOUCARD, P. Z. S., 1878, 45 (Juan Viñas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 95 (San Miguel and Juan Viñas). — BANGS, Auk, XXIV, 1907, 290 (Boruca [Underwood]).

U. S. Nat. Museum: Bonilla (Ridgway) (Basulto).

Bangs Collection: El General de Térraba (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Fleming Collection: Turrialba (Underwood).

Carnegie Museum: Guápiles, Juan Viñas (Carriker). Three skins.

Rather plentiful over both slopes and the central plateau region, perhaps more abundant between 1,000 and 3,000 feet. They are almost always to be seen circling about over a hillside or open pasture, and are very shy as a rule, never coming within gunshot of a person, if they see him first. The native name "Tijereta" (a small pair of scissors) is derived from the shape of the tail.

159. *Rostrhamus sociabilis* (Vieillot).*Herpetotheres sociabilis* VIEILLOT, Nouv. Dict. d'Hist. Nat., XVIII, 1817, 318.*Rostrhamus sociabilis* MOORE, P. Z. S., 1859, 52. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (Gulf of Nicoya [Coll. O. Salvin]). — FRANTZIUS, Jour. für Orn., 1879, 369 (C. R.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 99 (Frantzius' record).

Bangs Collection: Bolson, Dec. 28, 1907 (Underwood).

Salvin says (*Ibis*, 1869, 317), in his notes on Mr. Lawrence's Catalogue, in regard to this species: "We have no specimen from the Gulf of Nicoya, nor can I find any mention of the species in our manuscript lists of Arcé's collections." The presence of the species in Frantzius' list (Jour. für Orn., 1869, 369) rests wholly upon the record given by Lawrence the previous year, therefore there is absolutely no authentic published record of the occurrence of this kite in Costa Rica, and were it not for the specimen collected at Bolson by Underwood (mentioned above) the species would have to be dropped

from the list of the birds of Costa Rica. As it now stands, the first record for Costa Rica is the specimen above cited. There is apparently no reason why the bird should not be found there, and its absence is unusual.

160. **Leptodon uncinatus** (Temminck).

*Falco uncinatus* TEMMINCK, Pl. Col., 1824, 103, 104, 105.

*Cymindis uncinatus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (San José [Frantzius]).

*Leptodon uncinatus* SHARPE, Cat. Birds Brit. Mus., I, 1874, 330 (no C. R. record). — BOUCARD, P. Z. S., 1878, 45 (Juan Viñas, one specimen).

*Regerhinus uncinatus* NUTTING, Proc. U. S. Nat. Mus., V, 1882 (La Palma de Nicoya). — RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., 1876, I, 159 (C. R. [Frantzius]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 102 (Barranca [Arcé]).

C. H. Lankester Collection: Juan Viñas.

Carnegie Museum: Juan Viñas (Carriker). One adult.

Probably found only over the central plateau and the Pacific slope, but in small numbers. Nutting says it was common at La Palma de Nicoya, but if it was, it certainly is not abundant anywhere else in Guanacaste, for neither Underwood nor Lankester took it there, nor did I ever meet with it. The single specimen which I secured at Juan Viñas was in a small patch of second growth woodland on the slope of a deep ravine. I saw no others.

161. **Leptodon cayennensis** (Gmelin).

*Falco cayennensis* GMELIN, Syst. Nat., I, 1788, 263. — TEMMINCK, Pl. Col., 270.

*Cymindis cayennensis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (Gulf of Nicoya [Coll. O. Salvin]). — FRANTZIUS, Jour. für Orn., 1869, 369 (C. R.).

*Leptodon cayennensis* SHARPE, Cat. Birds Brit. Mus., I, 1874, 333 (no C. R. reference). — RIDGWAY, Bull. U. S. Geol. and Geogr. Surv., I, 1876, 155 (Old Harbor and Talamanca [Gabb]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 126 (Pózo Azul de Pirris and Birris de Cartago). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 100 (references cited). — BANGS, Auk, XXIV, 1907, 290 (El Pózo de Térraba [Underwood]).

Bangs Collection: Pózo Azul de Pirris (Underwood).

Carnegie Museum: Pózo Azul de Pirris, Boruca (Carriker). Three skins.

Most of the records for this species are from the lowlands of the Pacific, although a few have been taken elsewhere. Two were taken by Gabb in southeastern Costa Rica, but it must be very rare, for I



never saw it in the same region, during the year I was there. Zeledón also records one from near Juan Viñas (Birris). Taking these records into consideration, the bird is evidently found over the whole of the lower portion of both slopes, up to 3,000 feet, but is not common anywhere. The specimens secured at Boruca (two) were taken in the forest in one of the deep valleys so common in that region.

162. *Harpagus fasciatus* Lawrence.

*Harpagus fasciatus* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1868, 429 (Guatemala). — SALVIN, Ibis, 1870, 115 (C. R. [J. Carmiol]). — SHARPE, Cat. Birds Brit. Mus., I, 1874, 363 (Guatemala to Panama). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 106 (Miravalles [Underwood]).

Bangs Collection: Escazú, one specimen (Underwood).

C. H. Lankester Collection: Guácimo and Banana River, two specimens.

Carnegie Museum: Cuáb্রে de Talamanca, ♀ (Carriker). One skin.

This is one of the rare hawks, not only of Costa Rica, but of the whole of Central America. Its habits are quite similar to the members of the genus *Falco*, as far as I was able to observe, and from what Mr. Lankester told me. A pair was seen at Cuáb্রে, but the male escaped.

163. *Falco albigularis* Daudin.

*Falco albigularis* DAUDIN, Traité, II, 131. — SHARPE, Cat. Birds Brit. Mus., I, 1887, 116. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (La Palma de San José, Pózo Azul de Pirris). — CHERRIE, Auk, IX, 1892, 327 (San José, a rare straggler).

*Falco rufigularis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 116 (references).

*Hypotriorchus rufigularis* SALVIN, Ibis, 1869, 319 (Costa Rica).

U. S. Nat. Museum: San Lucas de Dota (Basulto).

Bangs Collection: Cerro de Santa Maria, El General de Térraba, Los Cuádro de Irazú (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Cuáb্রে de Talamanca, Miravalles, El Pózo de Térraba (Carriker). Three skins.

Found on both the Pacific and Caribbean slopes, usually below 2,000 feet, but much more commonly on the Pacific. Its habits are typical of the genus, perching on a dead stub or exposed branch, and darting out after its quarry.

164. *Falco columbarius columbarius* Linnæus.

*Falco columbarius* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 90.—SHARPE, Cat. Birds Brit. Mus., I, 1874, 408.—CHERRIE, Auk, IX, 1892, 328 (San José; a skin brought to Mus. Nac. by M. Carranza).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 119 (references cited).

*Hypotriorchis columbarius* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (San José [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 369 (C. R.).

We have record of but two specimens of the Pigeon Hawk having been taken in Costa Rica, one by Carmiol and one by Carranza. I have never seen the bird in that country and I suppose that like other migrant hawks it is only an occasional straggler into the higher parts of the plateau region.

165. *Falco aurantius* Gmelin.

*Falco aurantius* GMELIN, Syst. Nat., 1788, 283 (*ex* Latham).—SHARPE, Cat. Birds Brit. Mus., I, 1874, 402 (Bahia and Demerara).

*Falco deiroleucus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 117 (Costa Rica [J. Carmiol]).

*Hypotriorchis deiroleucus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 135 (La Palma [Zeledón]).—FRANTZIUS, Jour. für Orn., 1869, 369 (La Palma).

This rare bird has not been taken in Costa Rica in recent years, and its presence on this list lies wholly on the two records cited above. Zeledón secured it at La Palma sometime prior to 1868, as recorded by Lawrence, while Frantzius' record is undoubtedly based on the same specimen. Salvin and Godman evidently secured it from Carmiol, but no locality is given. At best it can be classed as only a very rare straggler.

166. *Cerchneis sparveria phalæna* (Lesson).

*Tinnunculus phalæna* LESSON, Compl. Oeuv. Buffon, XX, 1847, 178 (Mexico).

*Falco sparverius* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (San José, Alajuela, Cartago).—CHERRIE, Auk, IX, 1892, 328 (San José, not resident in any part, Oct. 1 to Feb. 28).—UNDERWOOD, Ibis, 1896, 446 (Miravalles).

*Tinnunculus sparverius* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 134 (San José [Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 369 (C. R.).—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 403 (La Palma de Nicoya, not common).—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 498 (Irazú [Nutting]); p. 502 (San José, abundant [Nutting]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 121 (Orósi [Kramer], Irazú [Rogers], Reventazón, Jiménez, Talamanca, Juan Viñas [Underwood]).

*Cerchneis sparveria* SHARPE, Cat. Birds Brit. Mus., I, 1874, 435 (no C. R. spec.)—BOUCARD, P. Z. S., 1878, 45 (common at all altitudes).—BANGS, Auk, XXIV, 1907, 209 (Boruca [Underwood]).

*Falco sparverius phalæna* NELSON, Auk, XIX, 1902, 398 (crit.).

U. S. Nat. Museum: Guayabo, March (Ridgway and Zeledón).

Bangs Collection: San José, San Pedro, Tenorio, Bolson (Underwood).

Carnegie Museum: Guápiles, March 24; Guácimo, Oct. 26; El Hogar, Dec. 6 (Carriker). Six skins.

The exact status of the Sparrow Hawk of Costa Rica has been rather puzzling, but owing to the large series of specimens I have been able to examine not only of birds from Costa Rica and Chiriqui, but from Mexico and the southwestern United States, the true state of affairs becomes evident. It is a well known fact that the Sparrow Hawk is only a migrant in Costa Rica, reaching its greatest abundance there during the months of November, December, and January; and hence, having only winter birds for study, they present more than the usual difficulties experienced in determining birds in winter plumage, as anyone who has worked with them knows. There can be no doubt, however, that they are identical with the birds which breed in Mexico and the southwestern portion of the United States, and which were described by Lesson under the name of *Tinnunculus phalæna*. Whether this form is a good subspecies of the bird breeding in the eastern United States is another question, and one not easily decided. There are occasional birds from Costa Rica or Mexico as dark on the upper parts, especially on the crown, as any breeding bird from Massachusetts, and there may also though rarely be found an eastern bird almost as pale as those from the west. However, in a case such as that under discussion, where the species has such a tremendous variation both in size and coloration, even from the same locality, such extreme birds are rather to be expected and can be accounted for under the hypothesis of individual variation carried to an extreme. The validity of this race does not depend upon such a point, but on the question as to whether a series of breeding birds from the two regions will bear out the differences in a constant manner, which they certainly do in this case. I would say that while the western bird is not a very marked race, it is in my opinion a valid one, and the birds from Costa Rica are very probably a portion of those which breed in Mexico, drifting southward during the winter to better feeding-grounds.

## Subfamily PANDIONINÆ.

167. *Pandion haliaëtus carolinensis* (Gmelin).

*Falco carolinensis* GMELIN, Syst. Nat., I, i, 1788, 263.

*Pandion haliaëtus* SHARPE, Cat. Birds Brit. Mus., I, 1874, 449. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1901, 39 (no C. R. record).

*Pandion haliaëtus carolinensis* RIDGWAY, Proc. Acad. Nat. Sci. Phila., 1870, 143 (crit.). — BANGS, Auk, XXIV, 1907, 290 (Barránca de Puntarenas [Underwood], Aug. 12, 1906).

The specimen recorded by Mr. Bangs seems to be the first published record for Costa Rica and the only one. I took the bird at Guácimo in December, 1903, but the specimen was not preserved. I presume it is a rare resident of the lowlands along both oceans.

## Families ALUCONIDÆ AND STRIGIDÆ.

## KEY TO THE COSTA RICAN SPECIES.

- a.* Size small (wing not more than 150 mm.), usually less.
  - b.* Without ear-tufts.
    - c.* Toes feathered; breast and abdomen plain buff-ochraceous. *Glaux ridgwayi.*
    - cc.* Toes with only a few bristles; lower parts streaked or brokenly barred.
      - d.* Pileum and nape nearly concolorous with back, with paler streaks. *Glaucidium phalænoides ridgwayi.*
      - dd.* Pileum and nape grayer than back, thickly covered with small whitish spots.
        - e.* Pileum decidedly gray; side and flanks streaked but not barred; tail with three small white spots on each feather. *Glaucidium griseiceps.*
        - ee.* Pileum brown, sides of breast, sides, and flanks, brokenly barred; tail with four white bars (broken medially) and white tips. *Glaucidium jardinii.*
  - bb.* With distinct ear-tufts.
    - c.* Tarsi nearly bare of feathers. *Otus nudipes.*
    - cc.* Tarsi feathered to base of toes.
      - d.* Toes with bristly feathers scattered over upper surface. *Otus cooperi.*
      - dd.* Toes bare.
        - e.* Under surface of body finely and confusedly vermiculated, without distinct dark shaft-streaks. *Otus vermiculatus.*
        - ee.* Under surface light-colored, with sharp sooty-brown shaft-streaks, crossed with several wavy dark lines. *Otus choliba choliba.*
- aa.* Size larger (wing not less than 230 mm.).
  - b.* Without distinct ear-tufts.

c. Lower parts barred with black and white, or else whole chest blackish-brown, with abdomen buff-ochraceous.

d. Barred with black and white below and on hind neck.

*Strix nigrolineata*.

dd. Chest and upper parts blackish-brown; throat whitish.

*Pulsatrix perspicillata*.

cc. Lower parts brownish-ochraceous, streaked with dusky, or else pure white.

d. Above sooty-brown, with wavy lines of buffy; scapulars edged with white.

*Strix virgata*.

dd. Below pure white; above ochraceous, vermiculated with gray and dusky.

*Aluco pratincola*.

bb. With distinct ear-tufts.

c. Lower parts pale ochraceous or buff-white, streaked with white; face whitish; facial disc black.

*Rhinoptynx clamator*.

cc. Lower parts not conspicuously streaked.

d. Size large (wing, 389 mm.) distinctly barred on breast and flanks with dusky; throat whitish; no white spots on wings.

*Bubo virginianus mesembrinus*.

dd. Size smaller (wing, 300 mm.); lower parts grayish-ochraceous, finely vermiculated on chest and finely barred (brokenly) on abdomen with dusky; a post-ocular chestnut patch; wings with numerous large white spots.

*Lophostrix stricklandi*.

### Family STRIGIDÆ.

#### 168. *Rhinoptynx clamator* (Vieillot).

*Bubo clamator* VIEILLOT, Ois. Am. Sept., I, 1807, 52, t. 20.

*Asio mexicanus* SHARPE, Cat. Birds Brit. Mus., II, 1875, 231 (S. A.).

*Asio clamator* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 5 (Panama).

*Rhinoptynx clamator* BANGS, Proc. Biol. Soc. Wash., XX, 1907, 31 (San José, C. R. [Underwood]).

Carnegie Museum: El Pózo de Térraba, June 18, 1907, ♂ (Carriker).

I have followed Mr. Bangs in placing this bird in a separate genus (*Rhinoptynx* Kaup), for after having seen the bird in life and carefully examined it afterwards, I do not believe it to be either a *Bubo* or *Asio*.

The specimen taken by Underwood at San José is the first record of the species north of Panama and it is remarkable that another should have been found so soon afterwards in a different region.

#### 169. *Bubo virginianus mesembrinus* (Oberholser).

*Asio magellanicus mesembrinus* OBERHOLSER, Proc. U. S. Nat. Mus., XXVII, 1904, 179 (type — San José, C. R. [J. Carmiol]).

*Bubo virginianus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 366 (San José).

Evidently a rare bird in Costa Rica, and most likely found only in the higher portions of the country.

### 170. *Pulsatrix perspicillata* (Latham).

*Strix perspicillata* LATHAM, Ind. Orn., I, 1790, 58.

*Syrnium perspicillatum* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (Las Anonas [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 366 (C. R.). — SHARPE, Cat. Birds Brit. Mus., II, 1875, 277.

*Ciccaba torquata* FRANTZIUS, Jour. für Orn., 1869, 366 (Las Anonas).

*Pulsatrix torquata* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 403 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (Angostura).

*Ciccaba perspicillata* SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 28 (Nicoya [Arcé], Bebedero [Underwood]).

*Pulsatrix perspicillata* BANGS, Auk, XXIV, 1907, 294 (El Pózo de Terraba [Underwood]).

U. S. Nat. Museum: Pígres (Ridgway), San Joaquin de Dota (Basulto).

Bangs Collection: Cerro de Santa Maria, Bolson (Underwood).

C. H. Lankester Collection: Guanacaste.

Carnegie Museum: Guácimo, Rio Sicsola, Bebedero, El Pózo de Terraba (Carriker). Seven skins.

This species is probably the commonest of the Costa Rican owls, at least it is oftener seen and collected than any other. It is confined to the lower portions of both the Caribbean and Pacific slopes, from sea-level up to not much over 2,000 feet, although a few probably straggle up higher. They keep to the thick forest as a rule, but seem to like the banana-plantations in the Caribbean lowlands, where I often saw them, always in pairs, perched on a banana leaf-stalk.

### 171. *Otus choliba choliba* (Vieillot).

*Strix choliba* VIEILLOT, Nouv. Dict. d'Hist. Nat., VII, 1817, 39.

*Scops brasilianus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 366 (C. R.). — BOUCARD, P. Z. S., 1878 45 (San José). — SHARPE, Cat. Birds Brit. Mus., II, 1875, 108. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 22 (San José [Zeledón]).

*Megascops brasilianus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (La Palma de San José). — CHERRIE, Auk, IX, 1892, 327 (San José).

*Megascops choliba*, BERLEPSCH, Bull. B. O. C., XII, 1901, 8.

*Otus* vs. *Megascops*, Fourteenth Supp. A. O. U. Check-List, Auk, XXV, 1908, 372.

U. S. Nat. Museum: Retes (Cooper.)

Bangs Collection: San José (Underwood).

Carnegie Museum: Escazú, August 15, 1902, ♀ (Carriker).

There is no doubt that the common screech owl of Costa Rica is this species. Costa Rican birds agree with those from Panama and farther south, hence are true *O. choliba*, which was described from Argentina, and extends northward along the Andes to Colombia, Panama and Costa Rica.

Mr. Berlepsch points out very convincingly that the name *S. brasiliensis* Gmelin refers to *Glaucidium ferox*, and hence cannot be used for this species.

172. *Otus vermiculatus* (Ridgway).

*Megascops vermiculatus* RIDGWAY, Proc. U. S. Nat. Mus., X, 1887, 267 (Costa Rica).

*Scops guatemalæ* SHARPE, Cat. Birds Brit. Mus., II, 1875, 112, *part* (Veragua to Mexico). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 20, *part* (in synonymy)

Bangs Collection: La Candelaria, Oct. 8, 1892 (Underwood).

The status of this species and *O. guatemalæ* is in a very confused state, and I make no attempt to try to settle it, which would be impossible without more material than I have been able to examine. In Mr. Bangs's collection are two skins of an *Otus*, which are identical with Mr. Ridgway's type of *vermiculatus*, one bird from La Candelaria in the gray phase, and one in the red phase from Divala, Chiriquí. When carefully compared with Mr. Sharpe's description of *guatemalæ*, these birds show marked differences, apparently differing as much from that bird as that one does from *O. choliba choliba*; neither does the figure of *S. guatemalæ* agree with the skins of supposed *vermiculatus*. The only way in which this question can be definitely settled is by comparison with northern material. It is quite possible that there is another species of *Otus* which ranges in southern Mexico and Guatemala, and that this bird is the true *O. guatemalæ*. For the present it seems preferable to use the name given by Mr. Ridgway to the southern bird.

173. *Otus cooperi* (Ridgway).

*Scops cooperi* RIDGWAY, Proc. U. S. Nat. Mus., I, 1878, 116 (Santa Ana, Costa Rica [Zeledón]; coll. U. S. Nat. Mus.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1904, 19 (Mexico to Costa Rica).

*Megascops cooperi* HASBROUCK, Auk, 1893, 263 (crit.).

*Otus* vs. *Megascops* Fourteenth Suppl. A. O. U. Check List, Auk, XXV, 1908, 372 (crit.).

This species resembles *O. vermiculatus* more than *O. choliba choliba*, but may be easily distinguished from either by the presence of bristly feathers scattered over the upper surface of the toes. It is apparently a very rare bird, only the type specimen taken by Zeledón existing at Washington. Mr. Bangs has never secured it, nor did I collect it in Costa Rica. Messrs. Salvin and Godman (*Biologia*) say they have seen six specimens, including Mr. Ridgway's type of the species, ranging from Costa Rica to Mexico, and that all are very similar in coloration.

#### 174. *Otus nudipes* (Vieillot).

*Bubo nudipes* VIEILLOT, Ois. Am., Sept., I, 1807, 53, t. 22.

*Scops nudipes* SHARPE, Cat. Birds Brit. Mus., II, 1875, 121 (Costa Rica [Arcé]).

— RIDGWAY, Proc. U. S. Nat. Museum, I, 1878, 89 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 25 (Irazú [Rogers and Underwood], Santa Ana [Underwood]).

*Megascops nudipes* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (C. R. [Arcé, Coll. O. Salvin]). — SCLATER and SALVIN, Exotic Orn., 1868, p. 102 (C. R. [Arcé]). — SALVIN, P. Z. S., 1870, 216 (C. R. [Arcé]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (El Zarcero de Alajuela). — CHERRIE, Auk, IX, 1892, 327 (San José, rare). — HASBROUCK, Auk, X, 1893, 262 (La Carpintera and Cervantes, U. S. Nat. Mus.).

*Psilosops* COUES, MSS., 1898; SHARPE, Hand List, I, 1899, 289.

*Otus* vs. *Megascops*, Fourteenth Suppl. A. O. U. Check-List, Auk, XXV, 1908, 372.

U. S. Nat. Museum: Volcan Turrialba (Ridgway and Zeledón), La Carpintera (Cherrie).

Bangs Collection: Estrella del Mojón and Estrella de Cartago (Underwood).

Fleming Collection: Escazú (Underwood).

Carnegie Museum: Carrillo, September 2, 1905, ♀ (Carriker).

#### 175. *Lophotrix stricklandi* Sclater and Salvin.

*Lophotrix stricklandi* SCLATER and SALVIN, Ibis, 1859, 221. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 367 (C. R. [Hoffman]). — BOUCARD, P. Z. S., 1878, 45 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (San José, Santa Ana). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 50 (Lagarto); Auk, IX, 1892, 327 (San José, rather rare). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 14 (references cited).

*Scops stricklandi* SHARPE, Cat. Birds Brit. Mus., II, 1875, 124.

Bangs Collection: San José, Santo Domingo, Pózo Azul de Pirris and Escazú (Underwood).



Carnegie Museum: Rio Sicsola, El Hogar (Carriker). Two skins.

The range of this species seems to cover nearly the whole of the country, up to an altitude of about 4,000 feet, specimens having been taken at three widely separated points in the Caribbean lowlands (Rio Sicsola, El Hogar, and San Carlos), several in the vicinity of San José and from three points on the Pacific (Santo Domingo, Pózo Azul, and Lagarto de Térraba). The specimens which I secured were taken in the thick jungle, both being hidden away in small vine-covered trees.

#### 176. *Strix virgata* (Cassin).

*Syrnium virgatum* CASSIN, Proc. Acad. Nat. Sci. Phila., 1848, 124.— LAWRENCE, Ann. Lyc. N. Y., IX., 1868, 132 (Dota [Zeledón]).—FRANTZIUS, Jour. für Orn., 1869, 366 (Dota Mts.).—SHARPE, Cat. Birds Brit. Mus., II, 1875, 273 (Costa Rica).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (Alajuéla, Liberia, San José, Cartago).—CHERRIE, Auk, IX, 1892, 327 (San José, tolerably common resident).

*Ciccaba virgata* SALVIN, P. Z. S., 1870, 216.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 29 (Irazú [Rogers], Escazú and Santa Rosa [Underwood]).

*Strix* = *Syrnium*, Fourteenth Suppl. A. O. U. Check-List, Auk, 1908, XXV, 371.

U. S. Nat. Museum: Retes, near Cartago (Cooper), Guayábo (Ridgway and Zeledón).

Bangs Collection: Volcan de Irazú (Underwood).

Carnegie Museum: Escazú, El Pózo de Térraba, and Boruca (Carriker). Three skins.

All the records for this species are either from the central highlands or the Pacific slope and lowlands, from which we would infer that it does not occur in the Caribbean lowlands. It is quite common over the above mentioned districts, at least numerous specimens have been taken. The specimens which I took were in the heavy forest, in bunches of vines at no great height from the ground.

#### 177. *Strix nigrolineata* (Sclater).

*Syrnium nigrolineatum* SCLATER, Trans. Zool. Soc., IV, 268, pl. 63.—SHARPE, Cat. Birds Brit. Mus., II, 1875, 276 (Veragua).

*Ciccaba nigrolineatum* SCLATER, P. Z. S., 1859, 131.—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (San José [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 366 (C. R.).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (C. R.).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 27 (references cited).

*Strix* = *Syrnium*, Fourteenth Suppl. A. O. U. Check-List, Auk, XXV, 1908, 371.

Carnegie Museum: El Hogar, Mar. 21, 1907, ♂ (Carriker). One skin.

Evidently a very rare bird in Costa Rica, there seeming to be but one published record of its occurrence there (San José [Frantzius]). The single male which I secured at El Hogar was found in the thick forest, hidden away in a clump of vines in a low tree. Mr. Bangs has two skins from Panama.

#### 178. *Glaucidium griseiceps* Sharpe.

*Glaucidium griseiceps* SHARPE, Ibis, 1875, pp. 41, 259, Pl. II, f. 2.—SHARPE, Cat. Birds Brit. Mus., II, 1875, 196 (Guatemala to Panama).—SALVIN and GODMAN, Biol. Centr.-Am., III, 1897, 36 (Guatemala and Panama).—BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 32 (La Vijagua, Feb. 25, 1908 [Underwood]).

The first and only specimen of this species ever taken in Costa Rica is that recorded by Mr. Bangs. The bird is quite typical.

#### 179. *Glaucidium phalaenoides ridgwayi* (Sharpe).

*Strix phalaenoides* DAUDIN, Traité d'Orn., II, 1800, 206.

*Glaucidium phalaenoides* CABANIS, Jour. für Orn., 1862, 336.—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 501 (San José [Nutting]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (Alajuela and Cartago).—CHERRIE, Auk, IX, 1892, 327 (San José, tolerably common resident—note on habits).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 33 (references cited).

*Glaucidium gnoma* CABANIS, Jour. für Orn., 1862, 336 (El Salitral [Hoffmann])—FRANTZIUS, Jour. für Orn. 1869, 336 (San José).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (quotation of Cabanis' record, 1862).

*Glaucidium ridgwayi* SHARPE, Cat. Birds Brit. Mus., II, 1875, 205 (Costa Rica).

U. S. Nat. Museum: San José (Carranza) (Zeledón) (Ridgway).

Bangs Collection: Carrillo, San José, Bolson (Underwood).

Carnegie Museum: Bebedéro (Carriker). One skin.

This species ranges over both the Caribbean and Pacific slopes and the lower portions of the plateau region, but is more common in the vicinity of San José and the upper part of the Pacific slope. I have but one record from the lowlands of the eastern side (Carrillo).

#### 180. *Glaucidium jardinii* (Bonaparte).

*Phalaenopsis jardinii* BONAPARTE, Comt. Rend., XLI, 654.

*Glaucidium jardinii* CABANIS, Jour. für Orn., 1869, 208.—RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 415 (Costa Rica [Van Patten]).—SHARPE, Cat. Birds Brit. Mus., II, 1875, 207.—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (Cartago).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 36 (Rancho Redondo and Irazú [Underwood]).

Bangs Collection: Volcan de Irazú (?) (Underwood).

C. H. Lankester Collection: Volcan de Turrialba (W. Schaus).

Univ. of Nebraska: Volcan de Irazú (L. Bruner).

A very distinct form and easily recognized by its dark color and mottled back. It is found only in the high mountains, from 5,000 feet upwards. It is a very rare bird in Costa Rica and not often collected, living, as it does, in the dense forests of the mountains, where its small size and sedentary habits render it easily overlooked.

### 181. *Glaux ridgwayi* (Alfaro).

*Cryptoglaux ridgwayi* ALFARO, Proc. Biol. Soc. Wash., XVIII, 217 (La Candelaria Mts., near Escazú, ♂ juv. [Alfaro]).

It is a most unusual thing to find a race of the Acadian Owl so far south as Costa Rica. The type is an immature bird, but the phase of plumage which it represents is very different from the corresponding phase in *G. acadicus*, so that there can be no doubt of the validity or the species.

### Family ALUCONIDÆ.

### 182. *Aluco pratincola guatemalæ* (Ridgway).

*Strix flammea* var. *guatemalæ* RIDGWAY, Baird, Brewer, and Ridgway, N. Amer. Birds, III, 11 (Panama to Guatemala).

*Strix perlata* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 132 (San José [Frantzus]).  
FRANTZIUS, Jour. für Orn., 1869, 367 (C. R.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, III, 1897, 2 (references cited).

*Strix flammea* SHARPE, Cat. Birds Brit. Mus., II, 1875, 291, *part.*

*Strix flammea guatemalæ* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 125 (San José). — CHERRIE, Auk, IX, 1892, 327 (San José, tolerably common).

*Aluco pratincola guatemalæ*, Fourteenth Supp. A. O. U. Check-List, 370, Auk, XXV, 1908 (critical, on family and generic name).

Bangs Collection: San José (Underwood).

C. H. Lankester Collection: Ochomogo.

Evidently found only over the central plateau, where it appears to be fairly common in some places.

### Family PSITTACIDÆ.

#### KEY TO THE COSTA RICAN SPECIES.

I. Size very large, tail long and pointed (wing not less than 350; tail, 450).

a. Colors chiefly red; greater coverts and inner tertials mainly yellow; rump, upper and lower tail-coverts light blue. *Ara macao*, ♂, ♀.

aa. Colors chiefly yellowish olive-green; primaries blue above, greenish-yellow beneath. *Ara ambigua*, ♂, ♀.

II. Size medium or small (wing not more than 250).

*a.* Tail square or very slightly rounded, not pointed, the difference between shortest and longest rectrix never greater than longest claw (usually less.

*b.* Color above and below chiefly light apple-green, never any blue on under parts or on shoulder.

*c.* Size large (wing not less than 185); no blue on crown or else forehead bright crimson.

*d.* Feathers of crown and nape broadly tipped with light blue or bluish-lilac, nape feathers edged with blackish; forehead crimson.

*e.* A yellow spot below eye, less lilac on nape, little or no red on base of inner web of outer rectrix.

*Amazona autumnalis autumnalis*, ♂, ♀.

*ee.* No yellow on side of head, more lilac on nape, and red spot on tail prominent (concealed by coverts).

*Amazona autumnalis salvini*, ♂, ♀.

*dd.* No blue on crown, forehead concolorous with crown, or very slightly bluish.

*e.* Broad band of yellow across nape; no bluish tinge on forehead.

*Amazona auropalliata*, ♂, ♀.

*ee.* No yellow on nape; feathers tipped with bluish-lilac and edged with dusky; forehead slightly bluish.

*Amazona virenticeps*, ♂, ♀.

*cc.* Size smaller (wing not more than 165); crown deep indigo-blue, forehead white, lores and narrow ring around eye crimson; feathers of nape and interscapular region edged with black.

*d.* All of the outer wing-coverts bright crimson.

*Amazona albifrons*, ♂.

*dd.* No crimson on wing.

*Amazona albifrons*, ♀.

*bb.* Some part of the body conspicuously blue, or else shoulder blue; sides scarlet and other primaries edged with yellow toward tips.

*c.* Forehead and crown pure white; nape, sides of head, and lower parts blue or greenish-blue; center of throat white; wing-coverts spotted with bronzy brown.

*Pionus senilis*, ♂, ♀.

*cc.* No white on crown.

*d.* Whole head, throat, and chest bright blue; under tail-coverts red; jugulum slightly reddish.

*Pionus menstruus*, ♂, ♀.

*dd.* Crown brownish-gray, nape and chest golden-olive, throat dusky; shoulders deep blue; sides bright crimson, no red on under tail-coverts.

*Pionopsittacus haematotis*, ♂, ♀.

*aa.* Tail markedly pointed, central rectrices exceeding outer by at least length of culmen (usually much more).

*b.* Forehead bright crimson, or else dull salmon-red.

*c.* Size large (wing, 160); inner wing-coverts scarlet; no blue on wing.

*Conurus finschi*, ♂, ♀.

*cc.* Size small (wing, 130); fore-crown bluish-green; inner wing-

coverts yellowish-green; a large portion of quills deep blue;  
forehead salmon red. *Conurus canicularis*, ♂, ♀.

*bb.* No red on forehead.

*c.* Ear-coverts deep scarlet; no blue on inner webs of primaries  
towards tips. *Pyrhurra hoffmanni hoffmanni*, ♂, ♀.

*cc.* Ear-coverts same color as rest of head.

*d.* Lower parts decidedly golden-brownish; primaries with blue  
on both webs towards tips. *Conurus aztec*, ♂, ♀.

*dd.* Lower parts plain apple-green or yellowish-green (never  
brownish), with or without dusky bars on sides and flanks.

*e.* Nape, back, rump, upper tail-coverts, sides, and flanks  
barred with blackish; shoulders glossy black.

*Bolborhynchus lineatus*, ♂, ♀.

*ee.* No dusky barring; chin salmon-red; wing-coverts golden-  
brown; shoulders green. *Brotogerys jugularis*, ♂, ♀.

### Family PSITTACIDÆ.

#### 183. *Ara macao* (Linnæus).

(Native name "Lapa.")

*Psittacus macao* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 139.

*Ara macao* BOUCARD, P. Z. S., 1878, 46 (San Carlos). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 402 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Tres Rios, Jiménez, Rio Súcio, Las Trojas). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 49 (Boruca, common). — UNDERWOOD, Ibis, 1896, 445 (Miravalles). — SALVADORI, Cat. Birds Brit. Mus., XX, 1891 (Peje [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 565 (references cited).

*Sittace macao* LAWRENCE, Ann. Lyc. N. Y., IX, 131 (Las Anonas [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 364 (C. R.).

U. S. Nat. Museum: Pigres (Ridgway).

Bangs Collection: Bebedéro, Bolson (Underwood).

C. H. Lankester Collection: Cariblanco.

Carnegie Museum: Guápiles, Bebedéro (Carriker). Two skins.

Abundant throughout the lowlands of the Caribbean and Pacific, up to about 2,500 feet. Like all of the parrots they are very noisy, except when feeding; at such times they remain very quiet, especially when any one is near. They are usually to be seen in pairs or from four to six together, and as a rule perch in the tops of the tallest trees, completely out of gunshot. It is only possible to secure them when they are feeding in a low tree.

184. *Ara ambigua* (Bechstein).

(Native name "Lapa Azul.")

*Psittacus ambiguus* BECHSTEIN, Kurze Ueb., IV, 65.*Ara ambigua* SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 160.*Ara militaris* BOUCARD, P. Z. S., 1878, 46 (San Carlos, El Zarcéro). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (C. R.) — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 568 (Talamanca [Gabb], in Coll. U. S. Nat. Mus.).*Sittace militaris* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (J. Carmiol). — FRANTZIUS, Jour. für Orn., 1869, 364 (C. R.).

U. S. Nat. Museum: Bonilla (Ridgway), Guayábo (Ridgway and Zeledón).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Bangs Collection: Carrillo (Underwood.)

Carnegie Museum: Guápiles (Carriker &amp; Crawford). One skin.

This beautiful macaw is found only on the eastern side of Costa Rica, ranging over the whole of the Caribbean lowlands up to 2,000 feet, but is not abundant anywhere, that is, never as abundant as the preceding species. Their habits are the same. A female killed at Guápiles February 28, 1902, contained an egg in the oviduct, ready to be laid. It was about the size of a small hen's egg, but more elliptical and creamy-white in color.

185. *Conurus finschi* Salvin.*Conurus finschi* SALVIN, Ibis, 1871, 91, pl. 4 (Panama [Arcé]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Naránjo de Cartago and San José). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882 (C. R. [Van Patten]). — SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 184 (Chiriquí). — CHERRIE, Auk, IX, 1892, 327 (San José, a rare straggler).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Basulto) (Ridgway).

Bangs Collection: San Pedro de San José, Monte Redondo (Underwood).

Carnegie Museum: Guápiles (Carriker and Crawford), Miravalles (Carriker). Six skins.

With the exception of *C. aztec*, the commonest parrot throughout the Caribbean lowlands, ranging up to as high as 3000 feet, but commonest at low altitudes. It is also occasionally found on the Pacific slope in northwestern Costa Rica (Miravalles) having passed westward along the southern shore of Lake Nicaragua, thence southward through Guanacaste. Mr. Cherrie also reports it to be a rare

straggler about San José, while Zeledón and Underwood have both taken it there.

They are particularly abundant in the northeastern part of the Caribbean lowlands, in what is known as the Santa Clara Valley, where they are often seen flying about in large flocks, especially late in the afternoon and evening.

186. **Conurus aztec** (Souancé).

*Conurus aztec* SOUANCÉ, Rev. et Mag. Zool., 1857, 97 (Mexico). — BOUCARD, P. Z. S., 1878, 46 (San Carlos).

*Conurus aztec*, SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 192 (Costa Rica [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 575 (references cited).

U. S. Nat. Museum: La Concepcion de Jiménez (Cherrie), Jiménez (Alfaro).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Guápiles (Carriker and Crawford), El Hogar (Carriker). Seven skins.

The continental range of this species is quite large, extending from Mexico down to northeastern Costa Rica, yet there is no appreciable difference to be seen between Mexican and Costa Rican birds. I did not meet with the species in southeastern Costa Rica, and consequently believe it to be confined to the portion of the Caribbean lowlands north of Port Limon. It is very abundant in the vicinity of Guácimo and Guápiles, in fact the most abundant parrot on the Caribbean slope, associating with the preceding species. They are very destructive to cornfields, attacking the grain just as the kernels begin to harden and what they do not devour is spoilt by water entering the husk.

187. **Conurus canicularis** (Linnæus).

*Psittacus canicularis* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 142.

*Conurus canicularis* Papag., I, 503. — SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 201 (Costa Rica [Carmioli], San Juan [Frantzius]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 577 (references cited).

*Conurus petzi* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (San José [J. Carmioli], Sarchí [F. Carmioli], Juan [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 365 (San Juan). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (San José, Liberia and Alajuéla). — CHERRIE, Auk, IX, 1892, 327 (San José, irregular visitant). — UNDERWOOD, Ibis, 1896, 445 (Miravalles, not very common).

U. S. Nat. Museum: La Sabana (Zeledón), Alajuéla (Alfaro).

Bangs Collection: Bolson and Escazú (Underwood).

C. H. Lankester Collection: Guanacaste.

Carnegie Museum: Miravalles (Carriker). Two skins.

This parrot is confined to the lower parts of the plateau region (Pacific slope) and the higher parts of Guanacaste. It does not descend to the lowlands of the coast region, as far as I have been able to discover, but keeps above an altitude of about 1,000 feet at least. Its habits are quite similar to the other species of the genus.

188. *Pyrrhua hoffmanni hoffmanni* (Cabanis).

*Conurus Hoffmanni* CABANIS, Sitzb. d. Ges. naturf. Freunde zu Berlin, 13 of Nov., 1861. (Aguacaliente [Hoffmann]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (Angostura [J. Carmiol], Frailes [F. Carmiol]).—SCIATER and SALVINS Exotic Orn., 1868, 161, pl. 81.—FRANTZIUS, Jour. für Orn., 1869, 365 (Candelaria Mts.).—BOUCARD, P. Z. S., 1878, 46 (La Candelaria and Aguacaliente).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 578 (Navarro [Cooper]).

*Pyrrhua hoffmanni* CABANIS, Jour. für Orn., 1862, 335.—SALVADORI, Cat. Bird, Brit. Mus., XX, 1891, 230 (Angostura and Dota [J. Carmiol]).

U. S. Nat. Museum: El Copey, La Lagunaria, and Santa Maria de Dota (Basulto), La Cedral de Asserí (Underwood).

Bangs Collection: La Estrella and Azahar de Cartago (Underwood).

C. H. Lankester Collection: Tuís.

Fleming Collection: San Marcos and La Estrella (Underwood).

Carnegie Museum: Ujurrás de Térraba (Carriker); La Estrella and Azahar de Cartago, Escazú (Underwood). Eight skins.

I rather expected to find *P. hoffmanni gaudens* Bangs in southern Costa Rica, but found only a very slight trace of scarlet tips to the feathers of the occiput, *gaudens* having all the feathers of the occipital region strongly tipped with scarlet. One specimen from central Costa Rica has the whole head with the feathers broadly tipped with golden-yellow, the back more yellowish-green and the chest quite brownish.

This species is only found among the higher mountains of the interior, scarcely ever descending below 5,000 feet. They keep in the heavy forest, always found at those heights, and are rather difficult to find, except when feeding. I saw a flock of about a dozen birds at Ujurrás on one occasion and managed to secure three specimens.

189. *Bolborhynchus lineolus* (Cassin).

*Psittacula lineola* CASSIN, Proc. Acad. Nat. Sci. Phila., VI, 1853, 372 (Mexico).  
*Myiopsitta lineola* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Naranjo de



Cartago). — RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 544 (Naránjo de Cartago [Cooper]).

*Conurus lineolatus* SALVIN, Ibis, 1869, 319 (Angostura [J. Carmiol]).

*Bolborhynchus lineolatus* FINSCH, Papag. II, 130. — SALVADORI, Cat. Birds Brit. Mus., XX, 1891 (Angostura [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 579 (Mexico to Chiriquí).

Bangs Collection: Escazú (Underwood).

C. H. Lankester Collection: Vol. de Irazú.

Carnegie Museum: Escazú and Los Cuádras de Irazú (Underwood).

Three skins.

This beautiful little parroquet is by no means common in Costa Rica, while the smallness of its size causes it to be easily overlooked. With the exception of one record (Angostura), all the birds taken have been secured at high altitudes, that is above 5,000 feet. They go about in small flocks in the forest, which at these altitudes is very heavy, thus easily escaping observation as they sit in the tree-tops.

#### 190. *Brotogerys jugularis* (P. L. S. Müller).

*Psittacus jugularis* MÜLLER, Syst. Nat. Suppl., 1766, 80.

*Brotogerys jugularis* SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 259 (Bebedéro [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 582 (Guatemala to Colombia).

*Brotogerys tovi* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (Gulf of Nicoya [Coll. O. Salvin]). — FRANTZIUS, Jour. für Orn., 1869, 364 (Nicoya). — SALVIN, Ibis, 1871, 93 (Bebedéro [Arcé]). — BOUCARD, P. Z. S., 1878, 46 (San Carlos). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 402 (La Palma de Nicoya, very abundant). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Puntarenas and San Mateo). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 50 (Palmar, common). — UNDERWOOD, Ibis, 1896, 445 (Miravalles and Bebedéro). — BANGS, Auk, XXIV, 1907, 292 (Barranca de Puntarenas, El Pózo and Paso Real de Térraba (Underwood)).

U. S. Nat. Museum: Pigres and Santo Domingo de San Mateo (Ridgway).

Bangs Collection: Tenorio, Bolson, Cerro de Santa Maria, and Pózo Azul de Pirris (Underwood).

Carnegie Museum: Pózo Azul, Miravalles, Bebedéro, Esparta, and Las Ajuntas de Térraba (Carriker). Nineteen skins.

This species is confined entirely to the lower portion of the Pacific slope, from Chiriquí to Nicaragua, but does not usually go higher than about 1,000 feet, although a few are to be found up to 2,000 feet in some localities. They are nearly always seen in flocks of from half a

dozen to fifty or more, and keep in the open woodland and scattering trees more than in the heavy forests. As a rule they are very tame and can be easily approached as they sit together in pairs in a very affectionate manner.

191. ***Amazona virenticeps*** Salvadori.

*Chrysotis pulverulenta* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (Cervantes [J. Carmiol]).

*Chrysotis guatemalæ* FRANTZIUS, Jour. für Orn., 1869, 365 (Cervantes). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 145 (Cervantes [J. Carmiol]).

*Amazona guatemalæ* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (San Mateo)

*Chrysotis farinosa* BOUCARD, P. Z. S., 1878, 46 (San Carlos).

*Chrysotis virenticeps* SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 280 (Angostura [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 585 (Costa Rica and Chiriquí).

*Amazona virenticeps* SHARPE, Hand-List, II, 1900, 20.

U. S. Nat. Museum : Bonilla (Basulto).

Bangs Collection : Reventazón (Underwood).

C. H. Lankester Collection : Guácimo.

Carnegie Museum : Cuáb্রে de Talamanca (Carriker). One skin.

This species is merely the southern representative of *A. guatemalæ* from which it differs very little. Perhaps it should be considered only subspecifically distinct from that species, but from lack of material for comparison I have decided to follow other writers and retain it as a full species.

Notwithstanding that there is one record of the taking of this bird on the Pacific slope, I believe it to be confined almost entirely to the lowlands of the Caribbean within the limits of Costa Rica. It is not a common bird in Costa Rica, and one seldom seen. They keep to the heavy forest, but are occasionally seen flying over the open country in pairs.

192. ***Amazona auropalliata*** (Lesson).

*Psittacus (Amazona) auropalliatus* LESSON, Rev. Zool., 1842, 135.

*Chrysotis auropalliata* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 145 (San José [Frantzius]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 402 (La Palma de Nicoya). — SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 291 (Western side — Guatemala to Costa Rica). — UNDERWOOD, Ibis, 1896, 445 (Miravalles and Bagáces).

*Amazona auropalliata* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Liberia).

U. S. Nat. Museum : Pigres (Ridgway and Zeledón).

Bangs Collection: Tenorio and Bolson (Underwood).

Carnegie Museum: Bebedéro (Carriker). One skin.

Confined entirely to the northwestern portion of Costa Rica, from the southern end of the Gulf of Nicoya north to Nicaragua, and most abundant in the lower Tempisque Valley. They are very numerous about Bagáces and Bebedéro, are easily tamed, and are by far the most fluent talkers of the Central American parrots. Mr. C. F. Underwood says of this parrot (Ibis, 1896, 446): "In Bagáces these parrots are extremely abundant, and regularly make the town their headquarters; in fact the traveller arriving there a little before sunset is often deafened by their noise, and on his first visit is amazed by the strange scene. From all sides arrive innumerable bands and solitary pairs of 'Loros' (the Spanish name), which remain for about an hour squabbling and fighting, constantly changing their perches before going to roost in the low trees in the immediate vicinity of the houses. 'Supas' (Macaws) also make the town their roosting quarters. At daybreak there is a repetition of the noise; they then go off to their various feeding grounds."

193. ***Amazona autumnalis autumnalis*** (Linnæus).

*Psittacus autumnalis* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 147.

*Chrysotis autumnalis* SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 302 (Mexico to Honduras). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 501 (Mexico to Guatemala).

*Amazona autumnalis* SHARPE, Hand List of Birds, II, 1900, 21.

Carnegie Museum: Guápiles, Feb. 28, 1903, adult ♂ (Carriker & Crawford).

The specimen cited above agrees quite well with birds from British Honduras, with the following exceptions: yellow spot on sides of head a little smaller; more lilac on nape (about as much as in *A. a. salvini*) and more red on tail. Notwithstanding these differences it is much nearer to true *autumnalis* than to *salvini* and must be referred to it. I have seen other birds with a trace of yellow on the sides of the head, but this seems to be the only record of the taking of true *autumnalis* in Costa Rica.

194. ***Amazona autumnalis salvini*** (Salvadori).

*Chrysotis viridigenalis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (San José [F. Carmiol]). — FRANTZIUS, Jour. für Orn. 1869, 365 (C. R.).

*Chrysotis autumnalis* FRANTZIUS, Jour. für Orn., 1869, 365 (San José).

*Amazona diadema* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Jiménez).

*Amazona diademata* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 49 (Boruca, abundant).

*Chrysotis salvini* SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 300 (Péje [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 592 (Nicaragua to Colombia).

U. S. Nat. Museum: Bonilla (Ridgway) (Basulto), Pígres (Ridgway).

Bangs Collection: Guayabal (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), El Pózo de Térraba (Carriker). Three skins.

In view of the fact that nearly all the Nicaraguan and Costa Rican specimens of *Amazona autumnalis salvini* show signs of intergradation with the northern form, *A. a. autumnalis*, and in many cases are purely intermediates, I have placed the southern race as a subspecies of the northern, making it as above given. Chiriquían and Panaman birds are typical *salvini*, as are also birds from the extreme southwestern portion of Costa Rica (Térraba).

The apparent distribution of this species in Costa Rica is rather remarkable, if it really is as it seems to be. The bird is fairly common in the northern part of the Caribbean lowlands, but I never took it in Talamanca (the southeastern part), while on the Pacific coast it has never been recorded from the Nicoya peninsula or Guanacaste, but is fairly common in the Térraba Valley. The bird probably occurs to a small extent in the intermediate regions, having been overlooked by collectors, but certainly cannot be common. They keep almost entirely to the forests.

#### 195. *Amazona albifrons albifrons* (Sparrmann).

*Psittacus albifrons* SPARRMANN, Mus. Carls., III, 1787, t. 52.

*Chrysotis albifrons* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (Desmonte [Frantzius], Nicoya [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 366 (Nicoya and San Mateo). — SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 311 (Nicoya [Zeledón]). — UNDERWOOD, Ibis, 1896, 445 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 593 (Mexico to Costa Rica).

*Amazona albifrons* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Liberia).

U. S. Nat. Museum: Miravalles (Underwood).

Bangs Collection: Tenorio (Underwood).

Carnegie Museum: Bebedéro, Miravalles (Carriker). Five skins.

This species, like *A. auropalliata*, is confined to the northwest-

ern portion of Costa Rica, around the eastern side of the Gulf of Nicoya, the Nicoya Peninsula, and Guanacaste, north to Nicaragua. It is very abundant at Miravalles, more so than at perhaps any other locality. They feed on the so-called "guava" trees.

I was unable to compare Costa Rican specimens of this species with skins of authentic *albifrons* from the type locality in Mexico. Mr. W. DeWitt Miller described a supposedly small race of the species from southeastern Mexico, and suggested that Costa Rican birds were the same. They may prove to be distinct from true *albifrons*, but for the present I have left them without separation, which, if made, would have to be based entirely on size, a doubtful character in this family.

### 196. *Pionus senilis* (Spix).

*Psittacus senilis* SPIX, Av. Bras., I, 1824, 42.

*Pionus senilis* WAGLER, Monogr. Psitt., 1832, p. 604. — CABANIS, Jour. für Orn., 1862, 335 (C. R.). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (San José [Frantzus], Barranca [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 336 (Orósi and Tucurrique). — BOUCARD, P. Z. S., 1878, 46 (San Carlos, common). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Alajuela, Zarcero de Alajuela, Las Trojas, Barranca, Jiménez, Monte Redondo). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 49 (Lagarto, Boruca and Buenos Aires de Térraba). — SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 331 (Angostura [J. Carmiol], San José [M. L. Calleja]). — SALVIN and GODMAN, Biol. Centr. Am., Aves, II, 1897, 595 (Mexico to Costa Rica). — BANGS, Auk, XXIV, 1907, 292 (Paso Real de Térraba [Underwood]).

U. S. Nat. Museum: Guayábo, Bonilla (Ridgway and Zeledón), Bonilla (Basulto).

Bangs Collection: Pózo Azul de Pirris and El General de Térraba (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles (Carriker and Crawford), Pózo Azul de Pirris, Boruca (Carriker).

The most widely distributed parrot of Costa Rica, being found over the whole extent of the Caribbean lowlands as well as the western portion of the central plateau and the Pacific slope. It does not seem to be present, at least in any great numbers, in Guanacaste, for we have no record of its having been taken there. It is abundant from Puntarenas southward, especially in the Térraba Valley.

This species does not frequent the heavy forest as much as some of the others, preferring the edges of the "sabanas," streams, scattering trees in pastures, etc. They are very shy and hard to approach within gunshot, unless there is good cover intervening.

197. *Pionopsittacus hæmatotis* (Sclater and Salvin).

*Pionus hæmatotis* SCLATER and SALVIN, P. Z. S., 1860, 300 (Guatemala).—

LAWRENCE, Ann. Lyc. N. Y., IX, 1868, IX, 131 (Pacuare [J. Carmiol]).—

FRANTZIUS, Jour. für Orn., 1869, 366 (Angostura, Pacuare [J. Carmiol]).

*Caica hæmatotis* ZELEDÓN, Ann. Mus. Nac. de C. R., I, 1887, 124 (Pacuare and Naránjo de Cartago).

*Pionopsittacus hæmatotis* SALVADORI, Cat. Birds Brit. Mus., XX, 1891, 343 (Angostura [J. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1897, 597 (Mexico to Panama).

*Pionopsitta hæmatotis* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 520 (Rio Frio).

U. S. Nat. Museum: Naránjo de Cartago (Cooper), Bonilla (Ridgway and Zeledón).

Bangs Collection: Pózo Azul de Pirrís, La Vijagua, La Estrella de Cartago, El General de Térraba (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Peralta (Carriker).

Costa Rican birds are indistinguishable from specimens from Mexico and Honduras with which they were compared.

The present species also has a wide range outside of, as well as within, Costa Rica. Its area of greatest abundance is on the Caribbean slope between the elevations of 1,000 and 3,000 feet, seeming to prefer the very humid conditions prevailing at that altitude. Specimens are also recorded from the interior at about 5,000 feet, but I believe it to be rare at such high altitudes. It also occurs on the Pacific slope, in the region south of the Gulf of Nicoya, specimens having been taken at Pózo Azul de Pirrís and El General, in the upper part of the Térraba Valley, but it is also an uncommon bird in this region. Its habits are very much the same as those of *Pionus*, although it keeps to the forest more than that species.

## Family ALCEDINIDÆ.

## KEY TO THE COSTA RICAN SPECIES.

- a.* Lower parts mainly chestnut-brown.
  - b.* Very large (wing 174 mm.); throat white, upper parts bluish. *Ceryle torquata.*
  - bb.* Very small (wing 55 to 60 mm.); center of abdomen white; upper parts dark metallic-green.
    - c.* A band of dark green across chest. *Ceryle ænea ænea* ♀.
    - cc.* No green on chest. *Ceryle ænea ænea* ♂.
- aa.* Lower parts mainly white, with green or chestnut areas.

*b.* Upper parts dark metallic-green.

*c.* Size larger (wing 130; bill 65 mm.); sides streaked with green.

*d.* Broad band of chestnut across breast. *Ceryle amazona* ♂.

*dd.* Band of green across chest. *Ceryle amazona* ♀.

*cc.* Size small (wing 85; bill 45 mm.); sides and flanks heavily blotched with sooty-green.

*d.* Chest chestnut. *Ceryle americana septentrionalis* ♂.

*dd.* Narrow band of green across chest.

*Ceryle americana septentrionalis* ♀.

*bb.* Upper parts ashy-blue; pileum streaked with black; lower parts white, sides washed with chestnut.

*c.* Blue band across chest. *Ceryle alcyon* ♂.

*cc.* Ashy-brown band across chest. *Ceryle alcyon* ♀.

### 198. *Ceryle torquata* (Linnæus).

*Alcedo torquata* LINNÆUS, Syst. Nat. ed., 12, I, 1766, 180.

*Ceryle torquata* BONAPARTE, P. Z. S., 1837, 108.—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (Costa Rica [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 311 (Orósi and Navarro).—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 399 (La Palma de Nicoya).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Liberia, Jiménez).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 57 (Rio Grande de Térraba).—SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 122 (Péje [J. Carmiol], Nicoya [Sir E. Belcher]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 474 (Mexico to Chili).—BANGS, Auk, XXIV, 1907, 294 (Paso Real and El Pózo de Térraba, Barranca de Puntarenas [Underwood]).

*Streptoceryle torquata* CABANIS, Jour. für Orn., 1862, 161 (C. R. [Frantzius]).

Bangs Collection: Pózo Azul and Bolson (Underwood).

Carnegie Museum: Guácimo (Carriker). One skin.

This beautiful kingfisher, easily distinguished by its large size, is found along most of the larger streams on both the Caribbean and Pacific lowlands, but does not ascend to any great altitude, never going higher than about 1,000 feet. Their habits of feeding and nesting are the same as the other members of the genus, or rather of the common kingfisher of the United States, except that they do not frequent small streams, and are also almost always to be seen around the brackish lagoons of the Pacific coast.

### 199. *Ceryle alcyon* (Linnæus).

*Alcedo alcyon* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 115.

*Ceryle alcyon* MOORE, P. Z. S., 1859, 53.—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (Navarro and Cartago [Cooper]).—FRANTZIUS, Jour. für Orn., 1869, 311 (Navarro and Orósi).—SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 125 (Costa Rica, May [Cooper]).—RICHMOND, Proc. U. S. Nat. Mus., XVI,

1893, 511 (Rio Frio).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 472 (Costa Rican references).

*Streptoceryle alcyon* CABANIS, Jour. für Orn., 1862, 162 (C. R. [Frantzius]).

Bangs Collection: San José, Nov. 23–30, 1905 (Underwood).

Rather rare as a winter resident. It seems to arrive about the end of October and is found only in the region of the highlands or central plateau, not descending into the hot lowlands.

## 200. *Ceryle amazona* (Latham).

*Alcedo amazona* LATHAM, Ind. Orn., 1790, 257.

*Ceryle amazona* BOIE, Isis, 1828, 316.—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118 (C. R. [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 311 (Orósi and Navarro).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Pacuare).—SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 129 (Central America and greater part of S. A.).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 475 (Aguacaliente [Frantzius]).—BANGS, Auk, XXIV, 1907, 294 (El Pózo de Térraba [Underwood]).

*Chloroceryle amazonia* CABANIS, Jour. für Orn., 1862, 161 (C. R. [Frantzius]).

Bangs Collection: Bebedéro (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Térraba (Carriker); La Junta (Underwood).

With the exception of *C. aenea*, this is the least common of the resident kingfishers of Costa Rica. It is, however, distributed over almost the entire country up to an altitude of about 3,000 feet, but in small numbers. Its habits are very similar to the species following, with which it associates.

## 200. *Ceryle americana septentrionalis* (Sharpe).

*Ceryle cabanisi* LAWRENCE, Ann. Lyc. N. Y., IX, 118 (San José and San Carlos [J. Carmiol], Cartago [Cooper]).—FRANTZIUS, Jour. für Orn., 1869, 311 (Highlands of San José, Cartago and San Carlos).—BOUCARD, P. Z. S., 1878, 48 (common everywhere).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Jiménez, San José, Naránjo de Cartago).—CHERRIE, Expl. Zool. en C. R., 1891–2, 1893, 57 (Laguna de Siépe); Auk, IX, 1892, 324 (San José, tolerably common resident on both coasts up to 8,000 feet).

*Ceryle americana cabanisi* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 399 (La Palma de Nicóya).—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 501 (San José [Nutting]).

*Chloroceryle cabanisi* CABANIS, Jour. für Orn., 1862, 256 (C. R. [Hoffmann and Ellendorf]).

*Ceryle septentrionalis* SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 134 (Cartago [Cooper], Valsa [J. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 476 (C. R. references).—UNDERWOOD, Ibis, 1896, 443 (Miravalles, abundant).



*Ceryle americana septentrionalis* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 511 (Nicaragua).

U. S. Nat. Museum: San José (Ridgway and Zeledón), Bonilla (Basulto).

Bangs Collection: Jiménez, Cariblanco, San José, Tenorio, El General de Térraba (Underwood).

Fleming Collection: Carrillo (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirrís, Cuábre, Guácimo, Miravalles, El Pózo, Boruca (Carriker).

Birds from Costa Rica and Panama seem to be intermediate between specimens from British Honduras and Santa Marta, Colombia, both in the size of the bill and in the extent of the chestnut on the throat of the male. They have a little more chestnut than birds from British Honduras, but much less than those from Santa Marta, in which the chestnut runs well up over the throat. On the whole they are nearer to birds from British Honduras.

This species is very common over the whole of Costa Rica, from the sea up to at least 7,000 feet, although they are not abundant above about 5,000 feet. They prefer the smaller streams to the larger, although they frequent both. At Boruca I found a pair in a very small creek hidden away in the forest well up in the hills, a most unusual locality for this species.

## 202. *Ceryle ænea ænea* (Pallas).

*Alcedo ænea* PALLAS (*cf.* reprint Vroeg's Catalog, by Sherborn and Richmond).

*Ceryle superciliosa* GRAY, Gen. Birds, I, 1874, 82. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118 (C. R. [Ellendorf]). — FRANTZIUS, Jour. für Orn., 1869, 311 (C. R.). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 400 (La Palma, rare). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 478, *part* (Mexico to Panama).

*Chloroceryle superciliosa* CABANIS, Jour. für Orn., 1862, 256 (C. R. [Ellendorf]).

*Ceryle stictoptera* SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 139, Pl. IV, f. 2 (Central America).

*Ceryle superciliosa stictoptera* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 511 (Rio Frio).

U. S. Nat. Museum: Puntarenas (Alfaro and Cherrie), Bebedéro (Alfaro).

Bangs Collection: Santa Cruz and Bolson (Underwood).

Carnegie Museum: Guácimo, El Hogar, Bonilla (Carriker). Three skins.

Costa Rican birds are undoubtedly referable to the Colombian (Santa Marta) form, that is true *ænea* and not to *C. æ. stictoptera* (Ridgway). The northern race, which has been named *C. stictoptera*, is not a very good form, in my opinion, although birds from British Honduras and Mexico have the white spots on the secondaries very pronounced and constant. On the other hand some of the Santa Marta birds have traces of this spotting, and all the birds from Panama and Costa Rica are more or less intermediate, but always running nearer to the South American birds.

This dainty little kingfisher is not common in Costa Rica, while the nature of its habitat causes it to be easily overlooked. They are found on both the Caribbean and Pacific lowlands, up to at least 2,000 feet, frequenting, as a rule, very small creeks running through the heavy forest, where they are seen flitting back and forth or perched on a twig just over the water. The only exception to this habitat was a specimen secured on the edge of a small lake in an open pasture at Bonilla, where it was perched on some reeds.

### Family MOMOTIDÆ.

#### KEY TO THE COSTA RICAN SPECIES.

- a.* Size very small (wing 75 or 80 mm.); tail without spatulate tips; crown and nape chestnut, back green; blue spot over eye. *Hylomanes momotula.*
- aa.* Size medium or large (wing not less than 100 mm.); tail with spatulate tips.
  - b.* No brown on upper parts; back and wings green; lower parts brownish or tawny-green.
  - c.* Pileum black, surrounded by a blue band; lores, subocular and sub-orbital region black. *Momotus lessoni.*
  - cc.* Pileum green like back; forehead chestnut; a blue supraocular patch. *Prionornis carinatus.*
- bb.* Whole pileum chestnut-brown or else middle of back and abdomen rufous-brown.
  - c.* Whole pileum chestnut-brown; lores and a stripe on side of head below eye black; black spot in centre of breast.
  - d.* Size large (wing 150, tail 290 mm.); outer web of outer primaries deep purple; lower parts mostly chestnut-brown. *Urospatha martii.*
  - dd.* Size smaller (wing 110, tail 175 mm.); outer webs of primaries green; chin bluish-green; cinnamon-rufous of lower parts ending on lower breast; rest below bluish-green. *Prionornis minor.*
  - cc.* No brown on pileum; a postocular spot and middle of back chestnut; rest above (except wings and tail blue, feathers tipped with black),

throat and breast, tawny-olive, with a wedge-shaped black patch on throat, bordered with pale turquoise-blue; superciliar stripe of pale bluish-white. *Eumomota superciliaris australis*.

### 203. *Urospatha martii* (Spix).

*Prionites martii* SPIX, Av. Bras., II, 1824, 64, pl. 60.

*Momotus martii* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (Pacuare [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 311 (Pacuare and San Carlos).

*Urospatha martii* SALVADORI, Atti. R. Accad. Sci. Torino, IV, 1872, 179. — BOUCARD, P. Z. S., 1878, 49 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Naránjo de Cartago, Jiménez). — SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 314 (Angostura [J. Carmiol]).

*Baryphthengus martii* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 462 (C. R. references).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón).

Bangs Collection: Carrillo, Jiménez, La Vijagua (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles (Carriker and Crawford); Guácimo, Cuábre, Rio Sicsola, El Hogár (Carriker). Nine skins.

This beautiful large motmot, the largest of the family in Costa Rica, is found only in the Caribbean lowlands, up to an altitude of not more than 2,000 feet, and more commonly below 1,000 feet. It is never seen outside of the heavy humid forests of this region, usually goes about in pairs, and is most frequently seen digging about the overturned roots of some large tree or along an exposed bank of a creek. Their nests are made by excavating a hole in a clay-bank, after the manner of the kingfishers, but I have never found a nest with eggs.

### 204. *Prionornis minor* Hartert.

*Prionirhynchus platyrhynchus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (Atiro, Barránca, and Angostura [J. Carmiol], Dota and Grecia [E. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 311 (C. R.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Jiménez, Angostura, Barránca). — SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 315 (Angostura [Carmiol]); — UNDERWOOD, Ibis, 1896, 443 (Miravalles).

*Prionornis platyrhynchus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 467 (references).

*Prionornis minor* HARTERT, Nov. Zool., V, 1898, 498 (Panama to Costa Rica).

U. S. Nat. Museum: Bonilla (Alfaro).

Bangs Collection: La Vijagua, Reventazón, La Junta (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Guácimo, El Hogar (Carriker). Seven skins.

This species ranges over the whole of the Caribbean lowlands, up to about 2,000 feet and on the Pacific slope from the middle of the Gulf of Nicoya northward to Nicaragua. It is much more abundant on the Caribbean side, and seems to have crossed the low divide along the southern side of Lake Nicaragua, thence passing southwards. Its habits are the same as those of the preceding species. The birds are always seen in pairs.

205. **Prionornis carinatus** (Du Bus).

*Prionites carinatus* DU BUS, Bull. Ac. Brux., XIV, pt. 2, 1847, 108.

*Prionirhynchus carinatus* BOUCARD, P. Z. S., 1878, 49 (San Carlos — first record so far south). — SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 316 (Honduras to Nicaragua).

*Prionornis carinatus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 468 (Brit. Hond. to Costa Rica). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 32 (La Vijagua, March 3, 1908, ♂ [Underwood]).

We have but two records for the occurrence of this form in Costa Rica, the specimen taken by Boucard in 1878 and another by Underwood in 1908. It is evidently only a rare straggler in Costa Rica, that country being south of its range. Its habits are similar to those of the preceding species.

206. **Eumomota superciliaris australis** Bangs.

*Prionites superciliaris* SANDBACH, Rep. Brit. Assoc., 1837, 99.

*Eumomota superciliaris* SCLATER, P. Z. S., 1857, 257. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (C. R. [Ellendorf]). — FRANTZIUS, Jour. für Orn., 1869, 311 (C. R.). — BOUCARD, P. Z. S., 1878, 49 (Barranca). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 399 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119. — SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 317 (Bebedéro [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895 (Mexico to Costa Rica). — UNDERWOOD, Ibis, 1896, 443 (Bagáces and Bebedéro).

*Spathophorus superciliaris* CABANIS, Jour. für Orn., 1861, 255 (Costa Rica [Ellendorf]).

*Eumomota superciliaris australis* BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 104 (Bebedéro [Underwood]); Auk, XXIV, 1907, 294 (Barranca de Puntarenas [Underwood]).

Bangs Collection: Bolson (Underwood).

Carnegie Museum: Bebedéro and Miravalles (Carriker). Seven skins.

This handsome motmot is quite common in the vicinity of Bebedéro, conditions there seeming to be exactly suited to it. It has been taken

also at Bagáces, Miravalles, and Barránca, but is rare at all localities except the first mentioned. The Costa Rican range of this bird is probably the lower parts of the region from near the head of the Gulf of Nicoya to Nicaragua. It is not found on the eastern slope, this race being confined entirely to the Pacific. True *superciliaris* occurs farther north, on the eastern side.

207. **Momotus lessoni lessoni** Lesson.

*Momotus lessoni* LESSON, Rev. Zool., 1842, 174. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (San José and San Carlos [J. Carmiol], Dota and Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 311 (San José and whole highlands). — BOUCARD, P. Z. S., 1878, 48 (San José). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 399 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V., 1882, 501 (San José [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (San José, Alajuela, Santa Ana, Las Trojas, Cartago and Naránjo de Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 47 (Boruca and Buenos Aires, common); Auk, IX, 1892, 322 (San José, common resident). — SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 324 (Dota [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 456 (Mexico to Panama). — UNDERWOOD, Ibis, 1896, 443 (Miravalles, not so common as in the interior). — BANGS, Auk, XXIV, 1907, 294 (Barránca, Boruca, and El Pózo de Térraba [Underwood]).

*Prionites psalurus* CABANIS, Jour. für Orn., 1861, 255 (C. R. [Frantzius and Hoffman]).

U. S. Nat. Museum: Santo Domingo de San Mateo (Ridgway), San José (Zeledón), Santa Maria de Dota (Basulto).

Am. Mus. of Nat. History: San José and Herédia (Underwood).

Bangs Collection: Tenorio, Bolson, San José, Monte Redondo, Pózo Azul de Pirrís (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Pózo Azul de Pirrís, Guaitil, La Hondura, Miravalles, Esparta, Boruca, and Buenos Aires de Térraba (Carriker).

A series of skins from Costa Rica agrees very closely with another series from British Honduras, both exhibiting about an equal amount of variation in the lack or intensity of the cinnameous wash on the chest and abdomen, lighter or darker shade of green on the back, and amount of purple mixed with the blue of the nuchal band. This is a very common bird throughout the whole of the plateau region and the Pacific slope, from Chiriquí to Nicaragua. Like the other motmots, it lives in the forest, although it frequents the open woodland more than any of the other species. Mr. Cherrie gives an excellent description of the habits of the bird and its nest (Auk, IX, 1892, 322).

208. **Hylomanes momotula** Lichtenstein.

*Hylomanes momotula* LICHTENSTEIN, Abhandl. Akad. Wissensch. Berol., 1838, 449, pl. 4. — SHARPE, Cat. Birds Brit. Mus., XVII, 1892, 332 (Mexico to Guatemala). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 471 (Mexico to Guatemala). — UNDERWOOD, Ibis, 1896, 443 (Miravalles, three specimens, first record for Costa Rica).

Bangs Collection: Tenorio, La Vijagua, Cerro de Santa Maria (Underwood).

This bird occurs in Costa Rica only in the extreme northwestern portion, from Miravalles northward along both sides of the continental range, at an altitude of 1,000–2,000 feet. It is rare at Miravalles, neither Mr. Lankester nor myself being able to find it. Underwood reports it as commoner farther north, where a good series was obtained.

## Family CAPRIMULGIDÆ.

## KEY TO THE COSTA RICAN SPECIES.

- a.* Size large (wing, 290 mm.); mostly grayish or grayish-brown; streaked and blotched with black. *Nyctibius jamaicensis.*
- aa.* Size medium or small (wing not more than 215 mm.).
  - b.* Rictal bristles long and strong.
    - c.* One or more of four lateral rectrices with a greater or less extent of immaculate white or buff-ochraceous on inner web, or on both webs.
    - d.* Immaculate area on rectrices pure white.
      - e.* Outer primaries with a prominent white spot.
        - f.* Inner webs of four outer rectrices white apically, tipped with blackish-brown on all except the outer.
        - g.* Inner web of two outer rectrices crossed with a prominent sooty-black bar midway between base and tip. *Stenopsis cayennensis*, ♂.
        - gg.* No sooty-black bar on outer rectrices. *Stenopsis albicauda*, ♂.
      - ff.* No white on outer rectrix.
        - g.* Second and third rectrices entirely white on inner web. (except at base and partially so on outer web). *Nyctidromus albicollis*, ♂.
        - gg.* White confined to apical portion of inner web of second rectrix; white wing-spot surrounded by buff-ochraceous. *Nyctidromus albicollis*, ♀.
  - ee.* Outer primaries without white or buffy spot; no white jugular patch.

- f.* White area of tail confined to apical portion of rectrices and shorter, covering not more than 16 mm. at tips.  
*Antrostomus saturatus*, ♂.
- ff.* White jugular patch present; white tips to rectrices longer (40 to 50 mm.); little or no rufous spotting.  
*Antrostomus vociferus*, ♂.
- dd.* Immaculate area buff-ochraceous.
- e.* Buffy area confined to apical portion of both webs of three outer rectrices.
- f.* Inner webs of primaries without markings; no jugular patch; profusely spotted above and below with rufous.  
*Antrostomus saturatus*, ♀.
- ff.* Inner webs of primaries barred with rufous; a white jugular patch; no rufous spotting except on wings.  
*Antrostomus vociferus*, ♀.
- ee.* Buffy area confined to subterminal portion of inner webs of three outer rectrices (only buffy on under side, white above) and extends basally to tips of under tail-coverts.  
*Antrostomus carolinensis*, ♂.
- cc.* No immaculate area of white or buffy-white on any of the rectrices, usually brokenly barred with dusky and grayish or buffy.
- d.* Size large (wing, 210; tail, 145 mm.); primaries brokenly barred with rufous-buff; tail without lighter buffy edgings on inner webs.  
*Antrostomus carolinensis*, ♀.
- dd.* Size small (wing, 140; tail, 105 mm.); primaries with a large spot of buff-ochraceous and a smaller spot near base, no bars; inner webs of rectrices edged with yellowish buffy.  
*Stenopsis albicauda*, ♀.
- bb.* Rictal bristles small and inconspicuous; lower parts barred with dusky and grayish-white or buff-ochraceous.
- c.* Throat patch pure white.
- d.* Lower parts barred with sooty-black and pure white.
- e.* Upper parts paler, with more buffy and white spots on pileum and more grayish vermiculations on back and wings.  
*Chordeiles virginianus henryi*, ♂.
- ee.* Upper parts darker, with less spotting and vermiculations.  
*Chordeiles virginianus virginianus*, ♂.
- dd.* Lower parts barred with sooty-black and buff-ochraceous; under tail-coverts buffy.  
*Chordeiles acutipennis texensis*, ♂.
- cc.* Throat patch buff-ochraceous.
- d.* Under surface of primaries blotched with buffy posterior to the usual large isolated patch; under parts very ochraceous.  
*Chordeiles acutipennis texensis*, ♀.
- dd.* Under surface of primaries sooty-gray, without blotches, except the usual large isolated spot (white).
- e.* Wings and upper parts dark, with little grayish flecking.  
*Chordeiles virginianus virginianus*, ♀.

ee. Wings and upper parts thickly flecked with grayish and buffy, especially on wings and tail.

*Chordeiles virginianus henryi*, ♀.

209. ***Nyctibius jamaicensis jamaicensis*** (Gmelin).

*Caprimulgus jamaicensis* GMELIN, Syst. Nat., II, 1788, 1029.

*Nyctibius jamaicensis* GOSSE, Birds of Jamaica, 1874, 41, Pl. VI. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 120 (San José [Zeledón]). — RIDGWAY, Proc. U. S. Nat. Mus., IV, 1881, 336 (Sarchí de Alajuela, 2 ♀). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120. — HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 625. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 399.

Bangs Collection: El General, July 26, 1908, ♂ (Underwood).

Carnegie Museum: Guápiles, Jan. 18, 1904, ♂ (Carriker).

When I compared two specimens of *Nyctibius* from Costa Rica with a bird from Jamaica (which is typical *N. jamaicensis*) I was surprised to find them precisely alike in almost every character of any importance. The wing and tail and general coloration were exactly the same. The Jamaican bird had some slight tinge of rufous on the back and on the abdomen, which was also present in one of the Costa Rican birds, the other, however, being without it. The color-pattern of the tail was the same, also the intensity of color.

This great goatsucker is one of the very rare species of the family found in Costa Rica, probably not more than a half-dozen specimens ever having been taken in that country. It seems to be distributed over the whole of the country, specimens having been taken on the Caribbean lowlands (Guápiles), the central plateau (Sarchí de Alajuela), and the southwestern Pacific lowlands (El General de Térraba).

The specimen taken at Guápiles was caught alive in a banana plantation by a laborer.

210. ***Chordeiles virginianus virginianus*** (Gmelin).<sup>1</sup>

*Caprimulgus virginianus* GMELIN, Syst. Nat., I, ii, 1788, 1028.

<sup>1</sup>*Chordeiles virginianus henryi*. — I have been recently informed by Mr. C. H. Lankester that he has in his collection a single skin collected at Miravalles, Costa Rica, in 1906, which was identified by Mr. Ridgway as the Western Nighthawk. This identification was made by Mr. Ridgway entirely from memory, with no specimens to compare with, in which case there is some room for error. I have not seen the bird and can only give the record as it thus stands. If it should prove to be correct it adds another species to the list of Costa Rican birds.



*Chordeiles virginianus* SWAINSON, in Sw. Rich., Fauna Bor. Am., II, 1831, 496.

— HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 610 (no record from C. R.).

— SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 396 (no C. R. record).

*Chordeiles virginianus asseriensis* CHERRIE, Auk, VIII, 1891, 135 (Asserí, C. R.).

Carnegie Museum Collection: Rio Sicsola, Sept. 24, 1904; Miravalles, May 24 and 25, 1906 (Carriker). Five skins.

It is rather unusual that there are no records of the occurrence of this species in Costa Rica. The three specimens secured on the Sicsola River were shot from a flock of about a hundred birds which were flying up and down the river at dusk, catching insects over the sand-bars and over the water. I saw them every evening for several days, after which they disappeared.

I believe that the bird described by Mr. Cherrie was nothing more than a peculiarly marked winter bird of this species, for I am very certain that there is no form of *Chordeiles* breeding in Costa Rica.

## 211. *Chordeiles acutipennis texensis* (Lawrence).

*Chordeiles texensis* LAWRENCE, Ann. Lyc. N. Y., VI, Dec., 1856, 167; IX, 1868,

120 (El Rio Tirríbi [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 314 (San

José and Rio Tirríbi [Zeledón]). — ZELEDÓN, An. Mus. Nac. de C. R., I,

1887, 120. — CHERRIE, Auk, IX, 1892, 324 (San José, Nov. 6 and 7, 1888

[Alfaro]). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 616 (no C. R.

record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 397 (refer-

ences cited). — UNDERWOOD, Ibis, 1896, 442 (Salitral, a few seen, one shot).

*Chordeiles brasilianus* CABANIS, Jour. für Orn., 1862, 165 (C. R. [Hoffmann]).

— LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 120 (Cabanis).

U. S. Nat. Museum: Pígres, March 3-10, 1905 (Ridgway and Zeledón), San José, Oct. 29, 1891 (Underwood).

Bangs Collection: Limon, Nov. 28, 1896, San José, Sept. 10, 1883; Bolson, Dec. 25, 1907 (Underwood).

The Texan Nighthawk seems to be a common and regular winter visitor, but frequenting the central plateau region and the Pacific slope more than the eastern side. There are no records for the species from the Caribbean slope.

## 212. *Nyctidromus albicollis albicollis* (Gmelin).

*Caprimulgus albicollis* GMELIN, Syst. Nat., ii, 1788, 1030.

*Nyctidromus albicollis* BURMEISTER, Syst. Ueb., ii, 389. — CABANIS, Jour. für

Orn., 1862, 166 (C. R. [Frantzius and Hoffman]). — LAWRENCE, Ann. Lyc.

N. Y., IX, 1868, 120 (San José and Angostura). — FRANTZIUS, Jour. für Orn.,

1869 (San José, Orósi, Turrialba, Moravia). — BOUCARD, P. Z. S., 1878, 67 (Cartago). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 398 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 501 (San José [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (Las Trojas. Pózo Azul de Pirris, Alajuéla, Angostura, Naránjo de Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 46 (Boruca, Térraba, and Buenos Aires); Auk, IX, 1892, 324 (San José, abundant resident — both coasts to 8000 feet). — HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 587 (Irazú [Rogers], San José [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 393 (Mexico to Brazil). — UNDERWOOD, Ibis, 1896, 442 (Bebedéro). — BANGS, Auk, XXIV, 1907, 295 (Boruca).

U. S. Nat. Museum: Bonilla and Pígres (Ridgway), Guayábo (Ridgway & Zeledón), Bonilla, El Copey, Las Vueltas and Santa Maria de Dota (Basulto), Monte Redondo (Zeledón).

Bangs Collection: Bolson, Tenorio, Cerro de Santa Maria (Underwood).

C. H. Lankester Collection: Miravalles and Banana River.

Carnegie Museum: Guápiles (Carriker & Crawford); Vol. de Irazú, Pózo Azul de Pirris, Guácimo, Cuábres, Rio Sicsola, Carrillo, Bebedéro, Miravalles, Juan Viñas, El Pózo de Térraba, Boruca (Carriker). Large series.

Costa Rican specimens of *Nyctidromus* are practically identical with those from Cayenne, the type locality. There are some slight differences, but they will not hold constant in a large series, it being possible to exactly match Cayenne birds with specimens from Costa Rica.

As can be seen by the large list of localities cited above, this species is to be found in practically every part of the country, up to 9,000 and even 10,000 feet on the Volcanoes de Irazú and Turrialba. I found it breeding on the Volcano de Irazú at nearly 9,000 feet, a nest and eggs being taken there April 13, 1902. The incubation was far advanced at that date. The eggs were deposited in a slight depression in the leaves on the ground near an old brush-pile, just on the edge of a thicket of second-growth scrub. The two eggs are pale brownish-drab, with a few markings of pale lilac, overlaid with blotches of chestnut-rufous. Measurements:  $36 \times 24.5$  and  $30 \times 23$  mm.

### 213. *Stenopsis cayennensis* (Gmelin).

*Engoulevant varié de Cayenne* Montbéliard, Hist. Nat. Ois., ii, 577.

*Caprimulgus cayennensis* GMELIN, Syst. Nat., I, 1788, 1031.

*Stenopsis cayennensis* (not of Montbéliard) HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 583 (Panama into South America; no Costa Rican specimens).

— SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 392 (Costa Rican references).

U. S. Nat. Museum : Jiménez, July, 1892 (Verrill); Bebedéro, Feb., 1890, La Candelaria and Pózo Azúl de Pirrís (Underwood).

British Museum : Azahar de Cartago, Sept. 29, 1898 (Underwood).

This appears to be a very rare species in Costa Rica, not more than about five or six specimens having been taken in that country. It is a commoner bird in Panama and northern South America, but apparently Costa Rica is north of its regular range, so that only a few stragglers are found there. There should be no confusion regarding the distinction of *S. albicauda* Lawrence, from this species, the present form having a prominent blackish bar across the middle of the two outer rectrices, which is entirely wanting in *albicauda*.

214. ***Stenopsis albicauda* Lawrence.**

*Stenopsis albicauda* LAWRENCE, Ann. Lyc. N. Y., XI, 1874, 89 (Talamanca, Gabb Expedition; Cooper Coll., U. S. Nat. Mus.).

*Stenopsis cayennensis* (not of Gmelin) HARTERT, Cat. Birds Brit. Mus., XVI., 1892, 583, *part* (Panama into South America).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 392, *part*, in synonymy (reference to type of *S. albicauda*).

U. S. Nat. Museum : One female, type of species.

C. H. Lankester Collection : Miravalles, one female.

Carnegie Museum : Miravalles, one female (Carriker).

After an examination of Mr. Lankester's specimen and the one in the Carnegie Museum and a comparison of these with Lawrence's type of *S. albicauda*, Mr. Ridgway declares them to be the same and that Lawrence's species is a good one, very different from *S. cayennensis*. Prior to the taking of the female by Mr. Lankester, the type of the species was the only known specimen. There are now three, two of which are in this country and one in Costa Rica. I herewith give a description of the female.

*Female*. — Crown deep sooty-brown, with a small amount of rufous freckling ; a stripe from lores to nape (and encircling nape) of grayish-white, freckled with dusky ; throat and sides of head pale buffy, indistinctly barred with sooty-brown ; a narrow nuchal collar of bright buff-ochraceous ; back and chest finely, but brokenly, barred with sooty and pale buff ; wing-coverts and inner tertials grayish-sooty, with patches of whitish freckles and rufous spot ; scapulars sooty-black, with rufous freckling on outer edge and a conspicuous spot or edging of pale buff on inner web ; quills grayish-sooty, four outer primaries

marked with a broad bar of cinnamon-buff (broken and narrowed at shaft) and a large spot on inner webs near base ; rest of quills with a spot of same color on inner web ; two central rectrices dusky-gray, finely freckled with sooty, and crossed by eight broken bars of the same color ; rest of rectrices sooty-gray, barred with pale grayish-buff, and the buffy areas freckled with dusky ; all the rectrices edged on inner webs with yellowish-buff ; abdomen buffy-white, brokenly barred with dusky ; vent and under tail coverts buff-ochraceous. Length, 222 mm. ; wing, 140 ; tail, 110.

215. *Antrostomus saturatus* Salvin.

*Antrostomus saturatus* SALVIN, P. Z. S., 1870, 203 (Volcan de Chiriquí [Arcé]). — RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 614 (Irazú).

*Antrostomus rufomaculatus* RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 465 (Irazú [Alfaro]).

*Caprimulgus saturatus* HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 572 (Chiriquí). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 388 (no additional records).

U. S. Nat. Museum : Volcan de Irazú (Underwood).

Bangs Collection : Escazú and Volcan de Irazú (Underwood).

Fleming Collection : La Estrella de Cartago (Underwood).

C. H. Lankester Collection : Volcan de Turrialba.

Carnegie Museum : Volcan de Irazú, Apr. 12, 1902 (Carriker).  
Two skins.

This rare goatsucker is restricted to the high mountains, never having been taken lower than 5,000 feet above sea-level, and ranging from that altitude up to timber-line. I saw but two birds during six weeks collecting on the Volcan de Irazú, an adult female, and a young female in the juvenal plumage, both of which were secured.

I have seen no published description of either the female or immature bird, and for that reason give the following :

*Adult female*. — Differs from adult male as follows : Black of entire body more obscured by the cinnamon-rufous spots ; barring of rectrices almost uniform throughout, being much broken on all the feathers, except on the outer web of the outer rectrix ; light tips of rectrices pale cinnamon-buff and narrow, being not more than 15 mm. in width on third rectrix. Length, 231 ; wing, 153 ; tail, 123 ; tarsus, 16 mm.

*Female, juv.* — Entire upper parts rusty cinnamon-rufous, with a slight reddish tinge ; feathers with a subterminal black spot of irregu-

lar angular shapes, smaller and more concealed on upper back, larger on tertials and coverts; remiges and rectrices as in the adult female; feathers of lower parts slate-gray basally, broadly edged on throat and breast with the color of the back; abdomen and under tail-coverts pale rusty-buff. Length, 150; wing, 116; tail, 58 mm.

216. *Antrostomus vociferus vociferus* (Wilson).

*Caprimulgus vociferus* WILSON, Am. Orn., V, 1812, 71, pl. 41, figs. 1-3.—HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 568 (Mexico to Guatemala in winter). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 385 (most southern record given is Salvador [Richardson]).

*Antrostomus vociferus* BONAPARTE, Geogr. & Comp. List, 1838, 8. — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1894, 536 (San José, Feb. 24, 1889, ♀ — first record for Costa Rica).

There is but a single record for the taking of the Whip-poor-will in Costa Rica, that cited above by Mr. Cherrie. They are common in winter farther north, but evidently are only rare stragglers in Costa Rica.

217. *Antrostomus carolinensis* (Gmelin).

*Caprimulgus carolinensis* GMELIN, Syst. Nat., I, ii, 1788, 1028. — HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 565 (Costa Rica (Endres)). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 383 (south in winter to Colombia and Antilles).

*Antrostomus carolinensis* GOULD, Icones Avium, 1838. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 120 (Las Cruces de Candelaria [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 314 (Las Cruces de Candelaria, Nov., 1867 [Zeledón and by Dr. E. Joos at Guadeloupe, 1860]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120.

Bangs Collection: Vicinity of San José (Underwood).

Carnegie Museum: Rio Sicsola, March 21, 1904 (Carriker). One skin.

The Chuck-will's-widow seems to be quite rare in Costa Rica, but few specimens of it having been recorded from that country. It is quite probable that it does not cross over to the Pacific slope, but remains either in the Caribbean lowlands, or the eastern side of the central plateau. I never saw more than the one bird recorded above, in the five and a half years I spent in that country.

## Family MICROPODIDÆ.

## KEY TO THE COSTA RICAN SPECIES.

- a. Tail very stiff, with prominent protruding spines; size small (wing about 110 mm.).
  - b. Rump and upper tail-coverts dull brownish or grayish-sooty, never ashy.
    - c. Pileum and back deep sooty-black, with greenish reflections; rump and upper tail coverts dark grayish-sooty. *Chætura gaumeri* ♂, ♀.
    - cc. Pileum and back dull sooty, with scarcely any greenish reflections; rump and upper tail-coverts pale grayish sooty; inner webs of rectrices (above) decidedly paler and grayer than outer. *Chætura vauxi* ♂, ♀.
  - bb. Rump pale grayish-ash or dark cinereous.
    - c. Upper tail-coverts short and darker than the rump and falling short of tips of rectrices by about 20 mm.; rump pale grayish-ash. *Chætura spinicauda fumosa* ♂, ♀.
    - cc. Upper tail-coverts dark ashy-gray like the rump, and extending to within about 13 mm. of the tips of rectrices. *Chætura cinereiventris phæopygos* ♂, ♀.
- aa. Tail stiff or soft but never with prominent protruding spines.
  - b. With a white collar or a white streak over the eye.
    - c. Neck completely encircled by a white collar (wing 195 mm.). *Streptoprocne zonaris zonaris* ♂, ♀.
    - cc. A white streak over and behind eye; lores black (wing 150 mm.) *Cypseloides cherriei* ♂.
  - bb. No white on head or neck.
    - c. Size larger (wing 155 to 165 mm.).
      - d. Feathers of abdomen and under tail-coverts edged with white. *Cypseloides niger borealis* juv. ♂, ♀.
    - dd. No white edgings on lower parts, sooty-black throughout, throat slightly grayer. *Cypseloides niger borealis* ♂, ♀.
  - cc. Size smaller (wing 120 to 130 mm.).
    - d. Broad band of dark chestnut-brown encircling neck, broader in front. *Cypseloides brunneitorques* ♂.
    - dd. Without chestnut collar, sooty-black throughout, paler below. *Cypseloides brunneitorques* ♀.

218. *Streptoprocne zonaris zonaris* (Shaw).

*Hirundo zonaris* SHAW in Mill. Cim. Phys., 1796, 100, pl. 55.

*Hemiprocne zonaris* BOUCARD, P. Z. S., 1878, 67 ("Seen on Irazú"). — ZELFEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (La Palma de San José).

*Chætura zonaris* HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 476 (no C. R. record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1893, 373 (C. R. [Van Patten in U. S. Nat. Mus.]).

*Streptoprocne zonaris zonaris* OBERHOLSER, Proc. Biol. Soc. Wash., XIX, 1906, 67-70 (critical). — BANGS, Auk, XXIV, 1907, 295 (Boruca, six specimens [Underwood]).

Bangs Collection: San Pedro and Escazú (Underwood).

Fleming Collection: San Pedro and Los Cuádro de Irazú (Underwood).

C. H. Lankester Collection: Miravalles and Cariblanco de Sarapiquí.  
Carnegie Museum: Volcan Irazú, Paso Real de Térraba, and Peralta (Carriker); Tucurríqui (Underwood). Four skins.

Boucard was the first to see this handsome large swift in Costa Rica, but did not secure specimens of it. It seems rather strange that it was not taken by the early collectors, because it is by no means rare, although very hard to shoot. I have seen it in all parts of the country from near sea-level up to the craters of the Volcanoes de Irazú and Turrialba. I have never been able to find out where they breed, but having always seen the birds around the summits of volcanoes during the beginning of the breeding season, it seems not improbable that they have their nests in the cliffs of the inner walls of the craters.

#### 219. *Chætura vauxi* (Townsend).

*Cypselus vauxi* TOWNSEND, Jour. Acad. Phila., VIII, 1839, 148.

*Chætura vauxi* BAIRD, Birds N. Am., 145, 1858, pl. 18. — HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 481 (Honduras, most southern record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1893, 375 (Costa Rica [Van Patten, in U. S. Nat. Mus.]).

British Museum Collection: Los Cuádro de Laguna, July, 1898; Carrillo, Nov. 7, 1898 (C. F. Underwood).

The only published record for the occurrence of this swift in Costa Rica is that in the *Biologia*, which is the record of a skin collected by Van Patten, without locality. Mr. Ogilvie-Grant informs me, however, that there are two skins in the British Museum collected by Underwood, as given above. This is evidently a very rare bird in Costa Rica, being merely a straggler, but perhaps more abundant than the records tend to show, on account of the difficulty of collection.

#### 220. *Chætura gaumeri* Lawrence.

*Chætura gaumeri* LAWRENCE, Ann. N. Y. Acad. Sci., II, 1882, 245 (Yucatan). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 415 (C. R. [Van Patten]). — HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 482 (Yucatan and Chiriquí). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1893, 376 (no C. R. specimens).

U. S. Nat. Museum; Coliblanco (Ridgway); El Copey, Las Vueltas and La Lagunaria de Dota (Basulto); Guáyabo (Ridgway and Zeledón).

Bangs Collection : El General de Térraba, Los Cuádro de Irazú, Juan Viñas, Carrillo (Underwood).

Carnegie Museum : Cariblanco de Sarapiquí, Carrillo, La Hondura, and Los Cuádro de Irazú (Underwood).

The range of the present species covers practically the whole of Costa Rica, with the possible exception of the very high altitudes, although many specimens have been taken at Los Cuádro de Irazú, which is about 5,000 feet above sea-level.

It is taken in both the Caribbean and Pacific lowlands and is the commonest species of the genus in Costa Rica. I know nothing of their breeding, although it is a resident there throughout the year.

221. *Chætura spinicauda fumosa* (Salvin).

*Chætura fumosa* SALVIN, P. Z. S., 1870, 204 (Bugába, Panama). — HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 483 (Chiriquí). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 377. — BANGS, Proc. N. E. Zool. Club, 1908, 26 (Pózo Azúl de Pirris [Underwood]).

Bangs Collection : El General de Térraba (Underwood).

Carnegie Museum : Pózo Azúl de Pirris, six specimens (Underwood).

Mr. Bangs has thoroughly straightened out the status of the three small species of *Chætura* inhabiting Costa Rica, viz., *C. gaumeri*, *spinicauda fumosa*, and *cinereiventris phæopygos* (Proc. N. E. Zool. Club, 1908, XVI, 26). The present species is found only in the lowlands of the Pacific, and thus far has been taken only at Pózo Azúl de Pirris and in the upper Térraba Valley. The eastern and western birds are very easily distinguished.

222. *Chætura cinereiventris phæopygos* Hellmayr.

*Chætura cinereiventris guianensis* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 516 (Rio Frio).

*Chætura cinereiventris phæopygos* HELLMAYR, Bull. Brit. Orn. Club, XVI, 1906, 83 (Carrillo, a good series [Underwood]). — BANGS, Proc. N. Eng. Zool. Club 1908, 26 (Carrillo and Juan Viñas [Underwood]).

Carnegie Museum : Carrillo, ♂, ♀ (Underwood).

This species occupies the same position in the Caribbean lowlands which the preceding holds on the Pacific. Nothing more is known of the habits of either, except that they are occasionally seen flying about in small flocks, nor have they ever been taken in any other locality than Carrillo and Juan Viñas.



**223. *Cypseloides brunneitorques brunneitorques* (Lafresnaye).**

*Chætura brunneitorques* LAFRESNAYE, Rev. Zool., 1844, 81 (Colombia). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (San José). — RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 542 (San José [Zeledón]). — CHERRIE, Auk, IX, 1892, 324 (San José, resident, but not common). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 378 (C. R. [Van Patten in U. S. Nat. Mus.]).  
*Cypseloides brunneitorques* HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 432 (Mexico to Ecuador).

U. S. Nat. Museum: San José (Zeledón), Reventazón (Carranza).

Bangs Collection: El General de Térraba, Vol. de Irazú, Cariblanco de Sarapiquí (Underwood).

Fleming Collection: Los Cuádras de Irazú and San Pedro del Mojón (Underwood).

Carnegie Museum: Paso Real de Térraba (Carriker); Los Cuádras de Irazú, San Pedro del Mojón, Cariblanco de Sarapiquí (Underwood).

Rather an abundant bird over the greater portion of Costa Rica, but especially on the Caribbean slope and central plateau region. I saw one flock in the Térraba Valley, which were flying just behind a large flock of *Streptoprocne zonaris zonaris*, over the open "sabana." Underwood also took it farther up the Rio General de Térraba. Little or nothing seems to be known of the habits or breeding of this or any other of the family in Costa Rica.

**224. *Cypseloides niger borealis* (Kennerly).**

*Cypselus borealis* KENNERLY, Proc. Acad. Nat. Sci. Phila., 1857, 202.

*Cypseloides niger* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (San José). — CHERRIE, Auk, IX, 1892, 324 (San José, — a single specimen in Mus. Nac. de C. R. by José Zeledón, with note on label that bird was breeding). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1894, 379 (references cited).  
*Cypseloides borealis* HARTERT, Cat. Birds Brit. Mus., XVI, 1892, 495 (British Colombia to Costa Rica).

*Cypseloides niger borealis*, Eighth Suppl. A. O. U. Check-List, Auk, XIV, 1897, 126 (British Columbia to Costa Rica).

Bangs Collection: San Pedro del Mojón, Buenos Aires de Térraba (Underwood).

Carnegie Museum: San José and San Pedro del Mojón (Underwood).

There are but few Costa Rican records for this species, but with the exception of one from Buenos Aires, all are from the vicinity of San José, from which we might infer that the bird is more partial to the upland portion of the country than the lowlands. It has not been taken at all on the Caribbean side.

225. *Cypseloides cherriei* Ridgway.

*Cypseloides cherriei* RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 43 (Volcan de Irazú [Geo. K. Cherrie]).

This remarkable form is known only from the single specimen from which it was described, which was collected somewhere on the Volcan de Irazú by Mr. Cherrie for the Museo Nacional de Costa Rica, by which it was presented to the U. S. National Museum.

## Family TROCHILIDÆ.

## KEY TO THE COSTA RICAN SPECIES.

- a.* Exposed culmen not less than 29 mm. in length (measured in a straight line from frontal base to tip), usually more.
- b.* Bill straight or almost straight, not decidedly curved; entirely black.
- c.* Under parts dark shining green, with or without glittering throat.
  - d.* Throat not glittering, crown reddish coppery; forehead glittering green; rump bluish; bill very straight. *Doryfera veraguensis*, ♂, ♀.
  - dd.* Throat glittering blue-green; crown glittering violet; upper parts soft shining grass-green. *Eugenes spectabilis* ♂.
- cc.* Under parts not green, or only slightly washed on sides.
  - d.* Throat glittering purplish or dark flame-color; white spot on rump.
  - e.* Throat purplish; middle of breast, abdomen, and sides white. *Floricola superba superba*, ♂, ♀.
  - ee.* Throat dark flame-red; abdomen and sides drab. *Floricola constanti constanti*, ♂, ♀.
  - dd.* Throat dull brownish-drab, like breast and abdomen; sides washed with green and under tail-coverts shining green; upper parts green, crown dusky. *Eugenes spectabilis*, ♀.
- bb.* Bill more or less decidedly curved; mandible mainly flesh-color or reddish, or else throat blue or violet.
- c.* Tail long and wide, with nearly apical half of outer rectrices white; bill entirely black; throat violet or violet-blue.
- d.* Entire under parts, nape, and upper back deep, shining violet. *Campylopterus hemileucurus mellitus*, ♂.
- dd.* Only middle of throat violet-blue; grayish drab below; sides of body and under tail-coverts greenish. *Campylopterus hemileucurus mellitus*, ♀.
- cc.* Tail variously shaped, but never with outer rectrices more than tipped with white.
  - d.* Central pair of rectrices greatly elongated, the elongated portion whitish.
  - e.* Lower parts ashy-gray; upper parts blue-green; tail narrowly edged with white at tip; cinnamon malar and gular stripe. *Phaethornis guy coruscus*, ♀.
  - ee.* Lower parts buffy-ochraceous; buffy-bronze above, more ochraceous

on rump and abdomen; tail edged with buff; buffy gular and malar stripe. *Phaethornis longirostris longirostris*, ♂, ♀.

dd. Central pair of rectrices not greatly elongated, if at all.

e. Lower and upper parts shining blue-green; rump and upper tail-coverts bluish; a rusty gular stripe; middle rectrices pointed, with shafts white at tips. *Phaethornis guy coruscus*, ♂.

ee. Lower parts largely or entirely cinnamon-buff; bronzy-green above.

f. Basal half and tips of rectrices white. *Threeneles ruckeri*, ♂, ♀.

ff. Basal half of rectrices chestnut, tips white.

*Glaucis hirsuta æneus*, ♂, ♀.

aa. Exposed culmen less than 29 mm., usually not more than 25 mm.

b. Two or more pairs of lateral rectrices largely or wholly white (if other color present, located at tip of feathers).

c. Entire lower parts immaculate white; deep shining green above

d. Tail at least 65 mm. long; no violet-blue on crown.

*Heliothrix barroti*, ♀.

dd. Tail not more than 50 mm. long; forehead and crown glittering violet-blue. *Heliothrix barroti*, ♂.

cc. Entire under parts not immaculate white.

d. All the rectrices, except the middle pair, largely white.

e. Throat and crown greenish-blue, or else entire under surface to vent glittering green.

f. Throat and crown greenish-blue; abdomen white; back green.

*Florisuga mellivora*, ♂.

ff. Entire under surface (to vent) glittering green; crown and central rectrices deep bronze. *Elvira cupreiceps*, ♂.

ee. Entire under parts nearly white; sides of head and throat green; lateral rectrices tipped with white, leaving a narrow subterminal, oblique bar. *Elvira cupreiceps*, ♀.

dd. Not more than three outer pairs of rectrices white.

e. Lower parts glittering green or grayish-white; green above.

f. Lower parts glittering green.

g. Only two lateral rectrices white, tipped with deep blackish.

*Eupherusa egregia*, ♂.

gg. Three lateral rectrices white, tipped with bronzy-black; secondaries not brown. *Elvira chionura*, ♂.

ff. Lower parts grayish-white; soft green above.

g. Only two outer rectrices white; bill 18 to 19 mm.

*Eupherusa egregia*, ♀.

gg. Three outer rectrices white, with or without a dark subterminal bar.

h. No dark subterminal bar.

*Elvira nigriventris*, ♀.

hh. Dark subterminal bar present.

*Elvira chionura*, ♀.

ee. Lower parts not as in (e); whole throat, abdomen, breast, and forehead deep black, green above; under tail-coverts and three outer rectrices white. *Elvira nigriventris*, ♂.

- bb. No large white area on any of the rectrices (more than sometimes white tips or edges).
- c. Crown and forehead glittering blue or violet.
  - d. Either abdomen or throat glittering deep blue, or else entire under parts dirty grayish.
  - e. Throat blue, rest below greenish; tail metallic-green, with a dusky subterminal area. *Clais guimeti*, ♂.
  - ee. Abdomen and upper back blue, or else entire under parts dirty grayish.
  - f. Throat glittering green; tail dark steel-blue; abdomen blue. *Thalurania colombica venusta*, ♂.
  - ff. Entire under parts dirty grayish-white. *Clais guimeti*, ♂.
- dd. No blue on abdomen or throat; throat glittering coppery flame-color, with a blue pectoral spot; rest above and below (except upper back, black) shining or glittering green. *Panterpe insignis*, ♂, ♀.
- cc. Crown not blue or violet.
  - d. Throat and breast or entire under parts, shining or glittering green, sometimes slightly mixed with white or buffy, or with a blue spot in middle of throat.
  - e. Tail deep metallic-blue, or else chestnut-brown; no pale tips or edging.
  - f. Tail chestnut-brown; upper parts shining green. *Amizilis tzacatl dubusi*, ♂, ♀.
  - ff. Tail blue or blue-green; entire upper parts green.
    - g. A blue spot in middle of throat or breast, or else a blue auricular patch.
    - h. Lower parts glittering green; tail dull blue, deeply forked or ordinary; blue spot on throat or breast.
    - i. Tail deeply forked; outer rectrix edged with grayish, shafts white; a blue pectoral spot (wing, 40 mm.). *Popelairia conversi conversi*, ♂.
    - ii. Tail not forked; no pale edging to rectrices; blue spot on throat (wing, 75 mm.). *Heliodoxa jacula henryi*, ♂.
  - hh. Lower parts bluish-green; tail blue green, with subterminal blue area; a blue auricular patch. *Colibri cyanotis cabanidis*, ♂, ♀.
- gg. No blue on throat or auricular region.
  - h. Tail deep blue, without paler tips.
    - i. Entire under parts glittering green (including under tail-coverts); no bronzy-purple on rump; tail rather deeply forked (wing, 46 mm.).
    - j. Bill entirely black. *Chlorostilbon assimilis*, ♂.
    - jj. Mandible flesh-color basally. *Chlorostilbon caniveti salvini*, ♂.
  - ii. Abdomen white, or grayish, or glittering violet-blue, or else under tail-coverts metallic-blue, edged with grayish or white.
  - j. No chestnut on secondaries.
  - k. No white on abdomen.
  - l. Abdomen green; under tail-coverts metallic-blue, edged with paler.

- m.* Edgings on coverts ashy; bronzy-green above.  
*Saucerottia sophiæ*, ♂, ♀
- mm.* Edgings on coverts white, green on upper parts, especially of pileum, with a blue tinge.  
*Saucerottia cyanifrons alfaroana*, ♂.
- ll.* Abdomen glittering violet-blue; under tail-coverts plain steel-blue; shining green above, bronzy on rump.  
*Damophila panamensis*, ♂.
- kk.* Abdomen white or whitish, under tail-coverts white or sooty-gray, edged with white.
- l.* Abdomen white; coverts sooty-gray, edged with white.  
*Saucerottia niveoventer*, ♂, ♀.
- ll.* Abdomen and under tail-coverts white (tail 35 mm.).  
*Agyrtria boucardi*, ♂,
- jj.* Secondaries partially chestnut; under tail-coverts edged with rusty.  
*Saucerottia cyanura impatiens*, ♂, ♀.
- hh.* Rectrices tipped with white (wing 66 mm.); under parts mixed with white.  
*Heliodoxa jacula henryi*, ♀.
- ee.* Tail neither blue, blue-green, nor chestnut.
- f.* Lower parts soft shining green; feathers more or less edged with buffy; under tail-coverts green, edged with white; tail green, two outer rectrices white-tipped, with a dusky blue subterminal area.  
*Aphantochroa cuvieri*, ♂, ♀.
- ff.* Lower parts glittering green, abdomen purplish; tail and wings dusky bronzy-purplish.
- g.* Under tail-coverts violet.  
*Chalybura melanorrhoa*, ♂.
- gg.* Under tail-coverts white; chest tinged with blue.  
*Chalybura isauræ*, ♂.
- dd.* Throat and breast not shining or glittering green; if breast green, throat largely or wholly of another color.
- e.* Under parts uniform cinnamon or buff-ochraceous, without dusky spots on throat.
- f.* Central rectrices lengthened (15 mm. longer than outer); small (wing 40 mm.).  
*Phaethornis adolphi*, ♂, ♀.
- ff.* Central rectrices scarcely longer than outer.
- g.* A white postocular streak; tail tipped with white; upper parts shining grass-green.
- h.* Subterminal portion of rectrices grayish-sooty, no purplish edging on inner webs.  
*Oreopyra cinereicauda*, ♀.
- hh.* Subterminal portion of rectrices dark metallic-blue; inner edge of outer rectrices purplish.  
*Oreopyra castaneiventris calolæma*, ♀
- gg.* No white postocular streak nor tips to rectrices; upper parts bronzy-green.
- Tail entirely chestnut-brown, with dusky-bronze tips.  
*Amizilis cinnamomea*, ♂, ♀.

- hh. Only three outer rectrices cinnamon-brown and with a sub-terminal blackish band. *Calliphlox bryantæ*, ♀.
- ee. Under parts not cinnamon or buffy.
- f. Throat (with or without chin) shining or glittering violet-blue or lilac, with the breast green, or blackish, or white, or blue like the throat.
- g. Chin dusky-green; tail dark metallic-blue.
- h. Whole crown and nape glittering green; sides of head dusky. *Agyrtia amabilis decora*, ♂.
- hh. Only crown glittering; sides of head shining green. *Agyrtia amabilis amabilis*, ♂.
- gg. Chin concolorous with throat.
- h. Tail brilliant bronze. *Hylocharis eliciæ*, ♂, ♀.
- hh. Tail not bronzy; breast green; tail purplish-black; throat lilac. *Oreopyra castaneiventris calolæma*, ♂.
- ff. Throat not blue.
- g. Throat or crown white in abrupt contrast to contiguous parts, or else median line of under parts white, with more or less green along sides.
- h. Crown or throat white.
- i. Crown white, rest of body chiefly rich claret-color. *Microchera parvirostris*, ♂.
- ii. Throat white, crown glittering blue-green, tail ashy-gray. *Oreopyra cinereicauda*, ♂.
- hh. Median line of under parts white.
- i. Bill 28 mm.; tail tipped with white, and with a violet-purple spot on outer rectrix; under tail-coverts green. *Anthracothonax prevosti prevosti*, ♀.
- ii. Bill 20 mm.; no white tips to rectrices; no purple spot; under tail-coverts white. *Agyrtia boucardi*, ♀.
- gg. Crown not white (if throat white, rest of under parts white or grayish).
- h. Bill very strongly decurved, or else upper parts brownish, with a blue auricular stripe.
- i. Bill decurved; lower parts strongly streaked with black, white, and buff. *Eutoxeres aquila heterura*, ♂, ♀.
- ii. Upper parts brownish; grayish-sooty below, centre of throat glittering green (blue posteriorly); under tail-coverts cinnamon-buff. *Colibri delphinæ*, ♂, ♀.
- hh. Bill normal, upper parts green (at least back and rump).
- i. Tail (except central rectrices) rich violet-purple; median portion of throat blue-black. *Anthracothonax prevosti prevosti*, ♂.
- ii. Tail not violet-purple.
- j. Lower parts dirty ashy-gray (bill 23 mm.); upper tail-coverts purple.

- k. Under tail-coverts concolorous with abdomen.  
*Chalybura melanorrhoa*, ♀.
- kk. Under tail-coverts white. *Chalybura isauræ*, ♀.
- jj. Lower parts not as in (j).
- k. Throat glittering green, or lilac, or flame-color, or violet, with or without acuminate, elongated plumules on head, or else throat whitish, each feather with a dusky or bronzy spot, or else throat and abdomen buff, the latter with golden spots, or else breast with a black patch. Size small (wing not more than 43; bill not more than 16).
- l. Throat glittering green, or violet, or flame-color.
- m. Throat green, some of feathers on head elongated and acuminate.
- n. Green of throat followed (posteriorly) by black.  
*Lophornis helenæ*, ♂.
- nn. Green of throat followed (posteriorly) by white.
- o. Abdomen cinnamon, sides washed with green.  
*Lophornis adorabilis*, ♂.
- oo. Abdomen gray, washed with green.  
*Lophornis delatirii*, ♂.
- mm. Throat of a brilliant glittering color, but not green.
- n. Tail without rufous area or edgings (dark purple); throat deep flame-color.  
*Trochilus colubris*, ♂.
- nn. Tail with more or less rufous.
- o. Median rectrices shining green.
- p. Throat pinkish rose-color, without leaden tinge.  
*Selasphorus flammula flammula*, ♂.
- pp. Throat lilac-red, with a leaden hue.  
*Selasphorus flammula torridus*, ♂.
- oo. Median rectrices purplish-black or largely cinnamon.
- p. Throat violet-purple; tail long (35 mm.).  
*Calliphlox bryantæ*, ♂.
- pp. Throat rosy-red or flame-color; tail shorter (26 mm.).
- q. Throat flame-color; median rectrices largely rufous, only a stripe of purplish on outer web next to shaft.  
*Selasphorus scintilla*, ♂.
- qq. Throat rosy-red; median rectrices largely purplish-black.
- r. Median rectrices edged with cinnamon basally (bill, 16 mm.).  
*Selasphorus simoni*, ♂.

*rr.* Median rectrices edged with cinnamon towards tip (bill, 13 mm.).

*Selasphorus underwoodi*, ♂.

*ll.* Throat whitish, each feather with a dusky or bronzy spot, or else abdomen buff, with golden spots, or else the chest with a blackish patch.

*m.* Throat whitish, each feather with a dusky or bronzy spot.

*n.* Spots on throat shining bronze; crown and a patch below eye bronzy-black.

*Lophornis adorabilis*, ♀.

*nn.* Spots on throat dusky, not bronzy, except perhaps on sides of lower throat.

*o.* Flanks and under tail-coverts grayish-white; no rufous on rectrices; outer ones tipped with white.

*Trochilus colubris*, ♀.

*oo.* Flanks and under tail-coverts cinnamon-buff; rectrices partly cinnamon or rufous.

*p.* Central rectrices shining green.

*q.* Lateral rectrices tipped with cinnamon-buff. *Selasphorus flammula flammula*, ♀.

*qq.* Lateral rectrices tipped with whitish.

*Selasphorus flammula torridus*, ♀.

*pp.* Central rectrices rufous, banded with purplish, like lateral ones.

*Selasphorus scintilla*, ♀.

*mm.* Throat without dusky spots, but abdomen with golden spots, or else a black pectoral patch.

*n.* Throat buff; breast golden-bronze; abdomen spotted with bronze; a white bar across rump; crown greenish.

*Lophornis helenæ*, ♀.

*nn.* A large black pectoral patch; forehead and half of crown cinnamon.

*Lophornis delatirii*, ♀.

*kk.* Throat and lower parts variously colored; but not as in (*k*).

*l.* Tail dark metallic-blue, without green basally, and with or without prominent white tips.

*m.* Throat grayish or dirty white, immaculate.

*n.* Lower breast and abdomen shining green; larger (bill, 20 mm.); under tail-coverts white.

*Thalurania colombica venusta*, ♀.

*nn.* Breast and abdomen color of throat, only sides of chest and flanks greenish; smaller (bill 14-16 mm.); under tail-coverts white.

*o.* Bill entirely black. *Chlorostilbon assimilis*, ♀.

*oo.* Mandible flesh-color at base.

*Chlorostilbon caniveti salvini*, ♀.



*mm.* Throat not immaculate, either partly black or else mixed with white and greenish or blue.

*n.* Tail strongly forked (outer rectrix 23 mm., inner 12); upper throat black, lower white, with green spots.

*Popelairia conversi conversi*, ♀.

*nn.* Tail nearly square; throat and breast grayish-white, each feather with a green spot.

*o.* Bill shorter (19 mm.).

*Agyrtria amabilis amabilis*, ♀.

*oo.* Bill longer (21.5 mm.).

*Agyrtria amabilis decora*, ♀.

*ll.* Tail light bronzy-green (with or without blue subterminal area), or else white basally and forehead pale sooty.

*m.* Lower parts whitish, without markings.

*n.* Mandible flesh-color, forehead green; no white tail. *Agyrtria candida*, ♂, ♀.

*nn.* Bill black; forehead sooty-gray; tail white at base and tipped with white.

*Microchera parvirostris*, ♀.

*mm.* Lower parts not immaculate whitish.

*n.* Throat and breast dark shining green, feathers edged with white; abdomen white; tail with large blue subterminal area.

*Florisuga mellivora*, ♀.

*nn.* Lower parts white, except sides of throat and chin, which are marked with green spots; no blue subterminal area on tail.

*Cæligena hemileuca*, ♀.

## 226. *Doryfera veraguensis* Salvin.

*Doryfera veraguensis* SALVIN, P. Z. S., 1867, 154 (Cordillera de Tolé [Arcé]). — HARTERT, Tierf., 1900, 11 (C. R.).

*Doryfera ludoviciæ* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (Cervantes [J. Carmiol]).

*Hemisteophania veraguensis* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 313 (Costa Rica). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 40 (Irazú [Rogers], C. R. [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 253 (Costa Rica and Panama).

Bangs Collection: La Hondura (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: La Hondura, three specimens (Carriker).

This is rather a rare bird in Costa Rica and seems to be confined entirely to the higher parts of the Caribbean water-shed, at an altitude

of from 3,000 to 5,000 feet. The specimens taken were shot among shrubbery on the edges of the forest, where they were feeding on flowers. Its true habitat is, however, in the forest.

227. **Threnetes ruckeri** (Bourcier).

*Trochilus ruckeri* BOURCIER, P. Z. S., 1847, 46.

*Glaucis ruckeri* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (Costa Rica [Endres]).

— ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Jiménez and Angostura).

— RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 308 (Costa Rica).

*Threnetes ruckeri* REICHENBACH, Aufz. d. Col., 15. — SALVIN, Cat. Birds Brit.

Mus., XVI, 1892, 265 (Angostura [J. Carmiol], C. R. [Endres]). — SALVIN

and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 316 (Jiménez [Zeledón, in

U. S. Nat. Mus.]). — HARTERT, Tierr., 1900, 14 (Panama and Costa Rica).

— BANGS, Auk, XXIV, 1907, 295 (El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Jiménez (Verrill) (Alfaro).

Bangs Collection: Carrillo and Pózo Azul de Pirris (Underwood).

Carnegie Museum: Volcan de Turrialba (2,000 feet) (Carriker and Crawford); El Hogar, Guápiles, Guácimo (Carriker). Thirteen skins.

Confined to the forests of the Caribbean lowlands, from Panama to Nicaragua. This bird is nearly always to be found in patches of wild cane or "Wild Plantains," which are so abundant in the Caribbean lowlands, its chief source of food being the blossoms of these plants. It is usually found in company with *Glaucis hirsuta*, *Phaethornis longirostris* and *Agyrtria amabilis*.

On March 25, 1904, I found a nest of this species on the beach of the Sicsola River. It was placed in a thorny shrub on a low gravelly beach, the nest being about five feet from the ground. It was constructed almost entirely of vegetable down, adorned on the outside with lichens, moss, and a few fragments of wild cane blades, all held together with spider-webs. The nest measured: outside depth, 1.5; width, 1.75; inside depth, .65; diameter, 1.00 inch. It contained two fresh eggs, of the usual elliptical form, which measured  $13.5 \times 9$ ;  $13 \times 9$  mm.

228. **Glaucis hirsuta æneus** (Lawrence).

*Glaucis æneus* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1867, 232 (Costa Rica [Endres]); Ann. Lyc. N. Y., IX, 1868, 121 (Costa Rica [Endres]).

*Glaucis hirsuta* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 308 (Costa Rica). —

ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Pózo Azul de Pirris). —

SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 41 (Costa Rica [Endres]). —

SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 255. — HARTERT, Tierr. 1900, 15.

*Glaucis hirsuta æneus* BANGS, Auk, XXIV, 1907, 295 (El Pózo de Térraba [Underwood]).

Carnegie Museum : El Hogar and El Pózo de Térraba (Carriker).

Three skins.

Upon comparison of Costa Rican birds with Colombian, the differences pointed out by Mr. Lawrence for his *G. æneus* become apparent at once, and I thoroughly agree with Mr. Bangs in setting up Lawrence's name for the northern race of *G. hirsuta*.

This form ranges over the whole of the Carribean and Pacific lowlands, but in small numbers, never being abundant, as are the other species with which it associates (see notes on preceding species). I do not believe it is found above 1,000 feet. Its habits are the same as those of the preceding bird.

### 229. *Phaethornis guy coruscus* Bangs.

*Phaethornis emiliæ* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (Angostura and Barránca [Carmioli]). — BOUCARD, P. Z. S., 1878, 67 (Tres Rios). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 309 (Costa Rica). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 268 (Tucurríqui [Arcé], C. R. [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 317 (Irazú [Rogers]).

*Phaethornis guy emiliæ* HARTERT, Tierr., 1900, 19 (Costa Rica to Peru).

*Phaethornis guy coruscus* BANGS, Proc. N. Eng. Zool. Club, VIII, 1902, 26 (Boquete and Volcan de Chiriquí [Brown]); Auk, XXIV, 1907, 295 (El Pózo de Térraba [Underwood]).

U. S. Nat. Museum : La Estrella de Cartago (Zeledón), Los Reyes de Dota (Basulto), Jiménez (Verrill).

Bangs Collection : Boruca and Pózo Azul (Underwood).

C. H. Lankester Collection : Cariblanco de Sarapiquí and Cachí.

Fleming Collection : Cariblanco and Juan Viñas (Underwood).

Carnegie Museum : Volcan de Turrialba (2,000 feet) (Carriker and Crawford) ; Irazú, Juan Viñas, Ujurrás de Térraba, La Hondura (Carriker). Thirteen skins.

This handsome hummingbird is pretty well distributed over the Caribbean and Pacific watersheds ; on the Caribbean side it is found between 1,500 and 3,500 feet and does not mix with *P. longirostris longirostris* of the lowlands, while on the Pacific slope it is found not only at the higher altitudes but also mixes to a small extent with its relative of the lowlands. It is strictly a forest species, as are all of the genus, preferring the dark cool depths of the heavy forests of the Caribbean slope to any other part of Costa Rica. They also feed largely on several species of " Wild Plantains " found in the higher altitudes.

230. *Phaethornis longirostris longirostris* (Lesson and Delattre).

*Ornismya longirostris* LESSON & DELATTRE, Echo du Monde Savant, 1843, 1070.  
*Phaethornis longirostris* GOULD, Intro. Troch., 42.—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (Valsa [J. Carmiol], C. R. [Endres]). —BOUCARD, P. Z. S., 1878, 67 (Juan Viñas). —ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Jiménez). —CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 45 (Palmar, Boruca and Buenos Aires de Térraba). —SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 272 (Costa Rica [Endres and Carmiol]). —SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 318 (C. R.). —Underwood, Ibis, 1896, 442 (Miravalles). —HARTERT, Tierr., 1900, 20 (Guatemala to Colombia). —BANGS, Auk, XXIV, 1907, 295 (El Pózo and Boruca [Underwood]).

U. S. Nat. Museum : La Lagunaria de Dota (Basulto), Pózo del Pital (Cherrie), Jiménez (Alfáro).

Bangs Collection : Bolson, Tenorio, La Vijagua and Pózo Azul de Pirris (Underwood).

C. H. Lankester Collection : La Florida.

Carnegie Museum : Guápiles (Carriker and Crawford) ; Pózo Azul de Pirris, El Hogar, Cuábres, Rio Sicsola, El Pózo de Térraba, (Carriker). Twenty skins.

The most abundant lowland species of hummingbird in Costa Rica, inhabiting the forests of both the Caribbean and Pacific lowlands, more commonly on the eastern side and the southwestern Pacific, from Pózo Azul southwards. It is very fond of the flowers of the "Wild Plantain" and feeds on nothing else while they are in bloom. I have observed several nests of this species, all constructed in precisely the same manner. The only one found with eggs was taken near Jiménez, May 9, 1905, in the heavy forest. The nest was made entirely of fine grayish-brown vegetable fibres, bound together with spider-webs, and lined with the same material, and fastened by means of spider-webs to the under side of the pointed tip of a small palm leaf, about two feet above the ground. The edges of the leaf were slightly drawn together, forming a semicircular cavity which almost entirely concealed the nest as the leaf drooped towards the ground. It contained two fresh eggs of the usual elliptical shape, pure white, and measuring :  $14.5 \times 9$  and  $15.5 \times 8.8$  mm.

231. *Phaethornis adolphi* Gould.

*Phaethornis adolphi* BOURCIER MS. GOULD, Mon. Troch., I, pl. 35. —LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (Angostura [J. Carmiol], C. R. [Endres]). —RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 309 (Costa Rica). —ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Costa Rica). —HARTERT, Tierr., 1900, 25 (Mexico to Panama). —BANGS, Auk, XXIV, 1907, 295 (Boruca [Underwood]).

*Pygmornis adolphi* BOUCARD, P. Z. S., 1878, 67 (San Carlos). — CHERRIE, Expl. Zool. en C. R., 1890-1 (Lagarto, Boruca and Buenos Aires de Térraba). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 282 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 319 (Talamanca [Zeledón]). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 45 (Lagarto, Boruca, Buenos Aires). — UNDERWOOD, Ibis, 1896, 442 (Miravalles).

U. S. Nat. Museum: Jiménez (Verrill), Pózo del Pital (Cherrie).

Bangs Collection: Carrillo and Pózo Azul de Pirris (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles and Volcan de Turrialba (2,000 ft.) (Carriker & Crawford); Guápiles, Miravalles, Rio Sicsola, El Pózo de Térraba, El Hogar (Carriker). Ten skins.

This tiny little woodland species is distributed over the whole of the Caribbean and Pacific lowlands up to about 2,000 feet. It keeps near the ground, feeding upon all kinds of small flowers in season, besides the "Wild Plantains."

### 232. *Eutoxeres aquila heterura* Gould.

*Eutoxeres heterura* GOULD, Ann. & Mag. N. H., I, 1868, 455.

*Eutoxeres aquila* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 120 (Tucurríqui [Arcé])

— ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (C. R.).

*Eutoxeres salvini* SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 262 (Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 314 (Costa Rica).

*Eutoxeres aquila heterura* TACZANOWSKI & BERLEPSCH, P. Z. S., 1885, 132. — HARTERT, Tierr., 1900, 29 (Costa Rica to Ecuador).

Bangs Collection: Carrillo (Underwood).

Carnegie Museum: Volcan de Turrialba, 2,000 ft. (Carriker & Crawford). Nine skins.

The Costa Rican range of this species is restricted (so far as I am able to determine) to the Caribbean watershed from about 1,200 to 3,500 feet in altitude, but it is most abundant at about 2,000 feet, in the dense, humid forests of that elevation. I found it feeding abundantly on the flowers of a species of "Wild Plantain" which blooms nearly the whole year round in the locality visited. Other collectors have found it in small numbers at Carrillo, while I saw a single bird on the mountain side above Juan Viñas.

### 233. *Campylopterus hemileucurus mellitus* Bangs.

*Trochilus hemileucurus* LICHTENSTEIN, Preis-Verz. Mex. Vög., I.

*Campylopterus hemileucurus* CABANIS & HEINE, Mus. Hein., III, 13. — CABA-

NIS, Jour. für Orn., 1862, 162 (C. R. [Frantzius]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (citation of Cabanis, 1862).—FRANTZIUS, Jour. für Orn., 1869, 315 (San José).—BOUCARD, P. Z. S., 1878, 68 (Tres Rios and Rancho Redondo).—RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 310 (Costa Rica).—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 501 (San Jose).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (La Palma de San José).—CHERRIE, Auk, IX, 1892, 324 (San José).—SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 291 (Costa Rica [Carmioli]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 323 (Tucurríqui [Zeledón]).—HARTERT, Tierr., 1900, 32.

*Campylopterus hemileucurus mellitus* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 28 (Boquete and Volcan de Chiriquí, Panama [Brown]).

U. S. Nat. Museum : Escazú (Ridgway), Volcan de Irazú and Azahár de Cartago (Alfaro), Santa Maria de Doto (Basulto).

Bangs Collection : Volcan de Irazú, Escazú, Azahár de Cartago, La Estrella de Cartago, La Candelaria, San Pedro del Mojón (Underwood).

C. H. Lankester Collection : Cachí.

Carnegie Museum : Navarro (Cooper) ; Escazú, Volcan de Irazú, La Hondura, Juan Viñas, Ujurrás de Térraba (Carriker). Fourteen skins.

This beautiful large hummingbird ranges over the whole of the central plateau region, from about 3,000 feet up to 7,000 feet, wherever there still are virgin forests. It is very pugnacious and curious, frequently flying up close to a person's head and hovering there, advancing and retreating for some time, unless frightened away by an abrupt movement.

#### 234. *Florisuga mellivora* (Linnæus).

*Trochilus mellivorus* LINNÆUS, Syst. Nat., ed 12, I, 1766, 193.

*Florisuga mellivora* BONAPARTE, Consp. Av., I, 73.—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 122 (Costa Rica [Endres]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (C. R.).—SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 329 (Costa Rica [Endres]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 340 (Bebedéro [Arcé]).—HARTERT, Tierr., 1900, 25.—BANGS, Auk, XXIV, 1907, 295 (Boruca [Underwood]).

U. S. Nat. Museum : Bonilla (Ridgway) (Basulto).

Bangs Collection : San Pedro del Mojón (Underwood).

Fleming Collection : Pózo Azul de Pirris and Carrillo (Underwood).

Carnegie Museum : Guápiles and Volcan de Turrialba, 2,000 feet (Carriker and Crawford) ; El Hogar (Carriker). Eight skins.

A widely spread species, but not very abundant in any one locality. It ranges over both the Caribbean and Pacific lowlands and up over the plateau region to an altitude of perhaps not more than 4,000 feet.

**235. *Aphantochroa cuvieri* (Delattre and Bourcier).**

*Trochilus cuvieri* DELATTRE & BOURCIER, Rev. Zool., 1846, 310.

*Campylopterus cuvieri* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Pozo Azul de Pirris).

*Phæochroa cuvieri* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (Bebedéro [Coll. O. Salvin]). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 45 (Boruca and Buenos Aires). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 299 (Puntarenas [Salvin], Miravalles and Bebedéro [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 326 (Costa Rica to Venezuela).

*Aphantochroa cuvieri* HARTERT, Tierr., 1900, 37 (Costa Rica to W. Venezuela).

— BANGS, Auk, XXIV, 1907, 295 (Boruca [Underwood]).

U. S. Nat. Museum : Pígres (Ridgway and Zeledón).

Bangs Collection : Pozo Azul de Pirris (Underwood).

Carnegie Museum : Miravalles, Esparta, Bagáces, Bebedéro, Buenos Aires (Carriker). Six skins.

This species is confined entirely to the lower portions of the Pacific slope, from Chiriquí to Guanacaste. It is most abundant around the head of the Gulf of Nicoya. It is more or less a woodland species, but does not go into the heavy forest, preferring the open woodland, fringes of trees along streams, and second-growth scrub. I believe it is the only Costa Rican hummingbird which I ever heard sing. On one occasion at Buenos Aires I was attracted by a peculiar fine, sweet song, unlike anything I had ever heard before, which upon investigation proved to be from a male of this species, perched on a twig high up in a tree and singing away as though perfectly oblivious to his surroundings. His bill was pointed upward and as he sang his throat swelled and quivered, while his head moved from side to side as though lost in the ecstasy of the song.

**236. *Agyrtria candida* (Bourcier and Mulsant).**

*Trochilus candidus* BOURCIER & MULSANT, Ann. Soc. Phys. et Nat. Lyon, IX, 1846, 326.

*Agyrtria candida* SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 190 (Mexico to Chontales, Nicaragua). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 285 (Mexico to Chontales, Nicaragua). — HARTERT, Tierr., 1900, 46 (Mexico to Nicaragua).

Bangs Collection : San Pedro del Mojón, October, 1902, ♂; October, 1897, ♀ (Underwood).

Although this *Agyrtria* was generally supposed to be found in Costa Rica, I have been unable to find a single record for the actual taking of specimens there, with the single exception of the birds taken by

Underwood at San Pedro, as cited above, and which I have examined. Like many other species which are so rare in Costa Rica, the range of this bird does not normally include that country, and it is only an occasional straggler which is sometimes taken. It is a common bird further north.

237. *Agyrtria boucardi* (Mulsant).

*Arinia boucardi* MULSANT, Ann. Soc. Linn. Lyon, 1877, Oct. (Puntarenas, Costa Rica [Boucard]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (C. R.). — SALVIN, Cat. Birds Brit. Mus., XVI., 1892, 193 (Puntarenas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 286 (Puntarenas [Boucard]).  
*Sapphironia boucardi* BOUCARD, P. Z. S., 1878, 71 (Puntarenas, several specimens).

*Agyrtria boucardi* HARTERT, Tierr., 1900, 47 (Costa Rica).

U. S. Nat. Museum : Pígres, Feb. and March, 1905, about a dozen specimens (Ridgway, Zeledón, and Alfaro).

C. H. Lankester Collection : Palo Verde, Guanacaste, June, 1906, one ♂.

Carnegie Museum : El Coronado de Térraba, a good series (Carriker).

This exceedingly rare and local species of hummingbird was discovered by M. Adolph Boucard, at Puntarenas, probably in January, 1877, where he procured a few specimens in the mangroves near the town. It was known only from these type specimens for the next twenty-eight years, until finally in 1905, Mr. Robert Ridgway in company with the eminent Costa Rican ornithologists, Señores Zeledón and Alfaro, discovered its habitat and secured about a dozen specimens at Pígres on the Pacific coast not far from Puntarenas. They found it in the mangroves along the salt-estuaries at that point. Mr. C. H. Lankester secured a single male at Palo Verde on the Tempisque River in 1906, but saw no others. I believe this bird was taken in the mangroves also. In 1907, when I made a trip to the Térraba region, I determined to put forth every effort to secure the bird, and hunted carefully in the mangroves at Puntarenas for it without result. However, I was more fortunate at the mouth of the Rio Grande de Térraba, where I found it fairly abundant in one small spot in the mangroves along one of the branches of the delta of that river, and was enabled to secure a splendid series of both males and females. These specimens have been distributed among various museums in this country and in Europe, so that this bird, so long unknown and rare, is now fairly well known.



Its range very probably extends from the head of the Gulf of Nicoya southward along the Pacific coast to some point in Chiriquí, the region of greatest abundance very likely being in the region of the delta of the Rio Grande de Térraba. It apparently never leaves the mangroves which line the brackish estuaries so abundant in places along the Pacific coast, or at least never goes far from them. At the time I took the specimens at Coronado (July 3 and 9, 1907) they were feeding upon the blossom of a vine growing in the mangroves. I took specimens of the plant, but they were unfortunately lost, so that it could not be identified, but it has a purplish flower, having the shape of a small *Convolvulus*.

238. ***Agyrtria amabilis amabilis*** (Gould).

*Trochilus* (———?) *amabilis* GOULD, P. Z. S., 1851, 115.

*Damophila amabilis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (Pacuare [J. Carmiol]). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 319 (Costa Rica). — BOUCARD, P. Z. S., 1878, 71 (San Carlos).

*Polyerata amabilis* SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 237 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 310, *part* (Costa Rica to Ecuador).

*Agyrtria amabilis* HARTERT, Tierr., 1900, 48 (Costa Rica to Ecuador).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón) (Basulto), Jiménez (Cherrie).

Bangs Collection: Jiménez and Talamanca (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles (Carriker and Crawford); Guápiles, El Hogar (Carriker). Ten skins.

This is a common species over the whole of the Caribbean lowlands, but does not go higher than 1,500 feet above sea-level, and is most abundant below 800 feet. It is partially, but not wholly, a woodland species, feeding on the blossoms of the "Wild Plantain" in the forest with true forest species and also spending much of its time in the open woodland, about isolated trees in pastures, etc. It is greatly attracted by the flowers of the so-called "Guava" tree, where they are always to be found if any are in the vicinity.

239. ***Agyrtria amabilis decora*** (Salvin).

*Polyerata decora* SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 238 (Volcan de Chiriquí and Bugába, Panama [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 311 (Chiriquí [Arcé]).

*Damophila amabilis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Pozo Azul de Pirris).

*Polyerata amabilis* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 25 (Lagarto and Boruca).

*Agyrtia decora* HARTERT, Tierr., 1900, 48 (Chiriquí). — BANGS, Auk, XXIV, 1907, 295 (El Pozo, Boruca, and Paso Real de Térraba [Underwood]).

U. S. Nat. Museum: Rio Turubáles (Ridgway), Pozo Azul de Pirris (Zeledón).

Bangs Collection: Pozo Azul de Pirris (Underwood).

Carnegie Museum: Pozo Azul de Pirris, El Pozo, Boruca de Térraba (Carriker). Nineteen skins.

The differences between this form and the preceding, *A. amabilis*, are so slight that they cannot be claimed to be specific. In this form the bill is slightly longer, the glittering feathers of the crown extend a trifle farther backward, and the blue of the throat is of a slightly different shade.

Its Costa Rican range is confined to the southwestern portion of the Pacific lowlands, probably about as far north as Puntarenas. It is most abundant in the lower Térraba Valley. Its habits are precisely the same as those of the preceding form.

#### 240. *Saucerottia cyanura impatiens* Bangs.

*Saucerottia cyanura impatiens* BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 104 (type and only specimen, ♂, San Pedro del Mojón, Oct., 1904, Underwood).

It is not remarkable that a form of this Nicaraguan species should be found in Costa Rica, but it must certainly be a very rare bird, since no others have been taken since. It is easily recognized by the chestnut-brown color of the secondaries.

#### 241. *Saucerottia sophiæ* (Bourcier and Mulsant).

*Trochilus sophiæ* BOURCIER & MULSANT, Ann. Sc. Phys. et Nat., IX, 1846, 318.

*Saucerottia sophiæ* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 127 (San José and Dota [J. Carmiol]). — BOUCARD, P. Z. S., 1878, 71 (San José and Cartago). — HARTERT, Tierr., 1900, 53 (Costa Rica). — BANGS, Auk, XXIV, 1907, 295 (Barranca de Puntarenas [Underwood]).

*Hemithylaca hoffmanni* CABANIS, Jour. für Orn., 1862, 163 (San José [Hoffmann]).

*Amazilia sophiæ* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 319 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (San José). — CHERRIE, Auk, IX, 1892, 325 (San José, tolerably common). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 224 (Bebedéro and Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 203 (Las Cruces de Candelaria [Zeledón, in U. S. Nat. Mus.]). — UNDERWOOD, Ibis, 1896, 442 (Miravalles and Bebedéro).

U. S. Nat. Museum : Rio Turubáles, San José, Pígres, Monte Redondo (Ridgway); San José (Cherrie); Bebedéro and Escazú (Underwood); Bonilla (Zeledón).

Bangs Collection : San José, San Pedro del Mojón, and Escazú (Underwood).

Carnegie Museum : Escazú, La Hondura, Miravalles, Bagáces, Bebedéro, Esparta (Carriker). Thirty-four skins.

This species ranges over the whole of the central and northern portion of the plateau region, down to about 2,000 feet above sea-level (occasionally) on the Caribbean slope and over the whole of the Pacific slope and lowlands from the mouth of the Rio Grande de Tarcóles northward to Nicaragua. I did not see it in the Térraba Valley nor are there any records for it at Pózo Azul de Pirrís.

Like all the Costa Rican species of the genus, this bird frequents the open, seldom, if ever, penetrating any distance into the forest, and when it does so it is only in open woodland. It is more often seen in isolated clumps of trees, shrubbery, etc. It is also very fond of the blossoms of the "Guava" tree. I found it to be most abundant at Esparta and Miravalles.

242. *Saucerottia cyanifrons alfaroana* (Underwood).

*Amazilia alfaroana* UNDERWOOD, Ibis, 1896, 441 (Volcan de Miravalles).

*Saucerottia alfaroana* HARTERT, Tierr., 1900, 53 (Volcan de Miravalles).

While discussing the status of several species of hummingbirds with Mr. Bangs, he showed me a letter from M. Eugene Simon in which he stated that he had seen the type of *Amazilia alfaroana* Underwood at the British Museum and that the bird had been poorly described, in fact it had been compared with *Saucerottia sophiæ* while it was most nearly related to *S. cyanifrons* of Colombia, from which it differed but slightly.

He wrote as follows : "j'ai étudié au British Museum le type unique. Il a été mal décrit par Underwood et Salvin, car il est très voisin de *S. cyanifrons* Bourc. et Muls., sans doute une forme septentrionale de cette espèce."

Wishing further particulars in the matter I wrote to M. Simon requesting additional information concerning the type, if he could give it to me, and received the following reply : "C'est à tort que O. Salvin a comparé cet oiseau à *S. sophiæ* car il est beaucoup plus voisin de *S. cyanifrons*. Il se diffère cependant par la tête d'un bleu ver-

dâtre peu brillante (bleu violet foncé chez *S. cyanifrons*). Les supra-caudales cuivré-rougeâtre (noires comme les rectrices et très finement bordés de bronze chez *S. cyanifrons*). Le dessous du corps d'un vert doré plus jaune, le bec plus long, 20.5 mm. (chez *S. cyanifrons* de 16 à 17 mm.).

Therefore it is very evident that *Amazilia alfaroana* Underwood is a northern race of *Saucerottia cyanifrons* Bourc. & Muls., from which it is to be distinguished by the crown being dark greenish-blue instead of violet-blue; the upper tail-coverts dark reddish instead of blackish with narrow borders of bronze; by the under parts being yellowish golden-green; and by its longer bill (20.5 instead of 16 to 17 mm.).

#### 243. *Saucerottia niveoventer* (Gould).

*Trochilus* (———?) *niveoventer* GOULD, P. Z. S., 1850, 164 (David, Chiriquí). *Amazilia niveiventris* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 319 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Costa Rica). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 221 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 302 (Costa Rica [*fide* Gould] Talamanca [Zeledón, in U. S. Nat. Mus.]).

*Saucerottia niveoventer* HARTERT, Tierr., 1900, 54 (Costa Rica and Panama). — BANGS, Auk, XXIV, 1907, 295 (Boruca [Underwood]).

Carnegie Museum: Boruca and Buenos Aires de Térraba (Carriker).  
Twenty-three skins.

This handsome species is confined to the extreme southwestern portion of Costa Rica, in other words the Térraba Valley, and is even rare in the upper part of that region. It is very abundant at Boruca, and is evidently common from there southward through the Pacific slope of Chiriquí. They are attracted in great numbers by the flowers of the "Guava" tree, of which there are considerable numbers in the village of Boruca, planted there by the Indians years ago. C. F. Underwood collected over one hundred specimens in Boruca in 1906, yet when I was there the following year they were still very common. Where the birds spend the time while the guava trees are not in blossom I do not know, but very likely in the scrub and second-growth so common in that region.

#### 244. *Amizilis tzacatl dubusi* (Bourcier and Mulsant).

*Trochilus dubusi* BOURCIER & MULSANT in Ann. Soc. Agric. Lyon, ser. 2, v. 4, 141.

*Amazilia riefferi* CHERRIE, Expl. Zool. en C. R., 1890-1 (Buenos Aires); Auk, IX, 1892, 325 (San José, the most abundant species). — SALVIN, Cat. Birds

Brit. Mus., XVI, 1892, 216 (Orósi [Kramer], Irazú [Rogers], Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 300 (Talamanca [Zeledón, in U. S. Nat. Mus.]. — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 44 (Boruca). — UNDERWOOD, Ibis, 1896, 442 (Miravalles and Bagáces).

*Pyrrhophæna riefferi* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 127 (San José and Angostura [J. Carmiol], Cartago [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 317 (vicinity of San José). — BOUCARD, P. Z. S., 1878, 71 (San José and Cartago, common).

*Pyrrhophæna dubusi* CABANIS, Jour. für Orn., 1862, 163 (San José [Hoffman and Frantzius]).

*Amazilia fuscicaudata* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 318 (Costa Rica). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 398 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (San José and Naránjo de Cartago). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 517 (Rio Frio).

*Amizilis fuscicaudata* OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1899, 208 (critical).

*Amizilis tzacatl* RICHMOND, Auk, XVI, 1899, 324 (critical).

U. S. Nat. Museum: Bonilla and Pígres (Ridgway and Zeledón) (Basulto), Santa Maria de Dota (Basulto), Turrialba (Ridgway); San José, Escazú, Isla de Uva, and Boca Matina (Cherrie), Jiménez (Verrill).

Bangs Collection: San José, Pózo Azul de Pirrís, San Pedro del Mojón (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles, Esparta, Escazú, Pózo Azul de Pirrís, Miravalles, Boruca, El Hogar, Juan Viñas (Carriker). Twenty-three skins.

This is by far the commonest hummingbird in Costa Rica, being found from sea-level on both coasts up to not less than 6,000 feet. While it is decidedly a bird of the open country, I have taken it feeding upon "Wild Plantain" in the forest, but have never seen it in abundance in such localities. They prefer isolated groves, trees, and orchards, and are very fond of feeding at the blossoms of all the citrus fruits as well as the guava.

I have found the nest in various situations, such as rose bushes near a house, a small shrub in an orchard, and on a spray of bamboo beside the road. All nests observed were made of vegetable down, sometimes with a little moss and always covered on the outside with lichens. The eggs are white, of the usual shape, and average about  $13 \times 9$  mm.

When the orange-trees are in bloom, they come in great numbers,

feeding at the flowers and perching on the trees, and will drive away every other species of hummingbird which may come to feed. I never saw so small a creature exhibit such apparent rage as they do on some occasions.

244. **Amizilis cinnamomea** (Lesson).

*Ornismya cinnamomea* LESSON, Rev. Zool., 1842, 175.

*Amazilia cinnamomea* SALVIN, Ibis, 1870, 115 (Costa Rica); Cat. Birds Brit. Mus., XVI, 1892, 207 (Costa Rica, [Carmioli]). — BOUCARD, P. Z. S., 1878, 71 (San Mateo and Puntarenas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (C. R.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 293 (Mexico to Costa Rica). — UNDERWOOD, Ibis, 1896, 441 (Miravalles). — HARTERT, Tierr., 1900, 61 (Mexico to Costa Rica).

*Amizilis cinnamomea* OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1899, 207 (critical) — BANGS, Auk, XXIV, 1907, 295 (Barranca de Puntarenas [Underwood]).

U. S. Nat. Museum : Santo Domingo de San Mateo (Ridgway), San Lucas (Cherrie and Alfaro).

Bangs Collection : Miravalles and Bebedero (Underwood).

C. H. Lankester Collection : Alajuela and Bebedero.

Carnegie Museum : Bebedero, Esparta, Bagaces, Miravalles (Carriker).  
Ten skins.

The range of the present species is rather restricted in Costa Rica, it being confined entirely to the Pacific lowlands of the northwestern portion of the country, in fact the only places from which we have records of its occurrence are those situated around the upper portion of the Gulf of Nicoya and up the Valley of the Tempisque River. It does not go higher than about 1,500 feet, occasionally being taken at San Mateo and in the surrounding district. The bird is seldom met with in any other situation than very open woodland, bushy pastures, and second-growth scrub, as a rule perching not very high above the ground.

246. **Hylocharis eliciae** (Bourcier and Mulsant).

*Trochilus eliciae* BOURCIER and MULSANT, Ann. Sc. Phys. et Nat. Lyon, IX, 314.

*Chrysuronia eliciae* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (Costa Rica [Endres]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (C. R.). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 44 (Lagarto and Boruca). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 251 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 311 (Guatemala to Panama).

*Hylocharis eliciae* HARTERT, Tierr., 1900, 68 (Guatemala to Panama). — BANGS, Auk, XXIV, 1907, 295 (Boruca and El Pozo de Terraba [Underwood]).

U. S. Nat. Museum: Rio Turubáles, Pígres (Ridgway).

Bangs Collection: Pózo Azul de Pirris and San Pedro del Mojón (Underwood).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Boruca, Miravalles, El Pózo de Térraba (Carriker).

Twelve skins.

With the exception of a single record from San Pedro, near San José, all the records and available specimens of this handsome little species are from the Pacific coast region, covering the whole length of the country. It is scarce at very low altitudes, preferring an elevation of between 1,000 and 2,000 feet, and is most abundant in the Térraba Valley, where it is attracted in considerable numbers to the "guava" trees, which are in blossom from about the middle of June to the end of July.

247. ***Chlorostilbon caniveti salvini*** (Cabanis and Heine).

*Chlorolampis salvini* CABANIS & HEINE, Mus. Hein., III, 48 (Costa Rica). — CABANIS, Jour. für Orn., 1863, 164 (C. R.). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (San José [J. Carmiol]).

*Chlorostilbon caniveti* BOUCARD, P. Z. S., 1878, 71 (San José and Cartago). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 320 (Costa Rica). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 46, *part* (C. R. [Endres], Tucurríqui [Arcé], C. R. [Gould Coll.]). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, II, 1892, 263, *part* (Cartago [Cooper, in U. S. Nat. Mus.]). — UNDERWOOD, Ibis, 1896, 441 (Miravalles).

*Chlorostilbon salvini* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Liberia and San José). — CHERRIE, Auk, IX, 1892, 325 (San José).

*Chlorostilbon osberti salvini* RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 501 (San José [Nutting]).

*Chlorostilbon angustipennis* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 320 (Costa Rica). — VON BERLEPSCH, Proc. U. S. Nat. Mus., XI, 1888, 564 (Cartago [Cooper]). — CHERRIE, Auk, IX, 1892, 325 (San José).

*Chlorostilbon caniveti salvini* HARTERT, Tierr., 1900, 75 (Costa Rica).

U. S. Nat. Museum: Sabanilla and Alajuéla (Alfáro), Monte Redondo (Zeledón).

Bangs Collection: Rancho Redondo, San José, Escazú, San Pedro del Mojón, Dota Mts. (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Bagáces and La Estrella de Cartago (Carriker).

Two skins.

There has been a great deal of confusion about the name of the

*Chlorostilbon* inhabiting the highlands and northwestern Pacific coast region of Costa Rica, but after carefully examining a large amount of material, I have reached the conclusion that but one form is found there, which must be known as a subspecies of the Mexican bird, *C. caniveti*. The difference between Costa Rican and Mexican birds is very obvious and constant. This bird frequents shrubbery, the edges of the forest, and second-growth scrub, and is nowhere very abundant. It is not found on the Caribbean watershed, except at points above 2,000 feet, apparently not liking the excessive humidity. It spreads over the entire portion of the central highlands and the Pacific coast region of Nicoya and Guanacaste, but in southwestern Costa Rica it is replaced by the succeeding species.

248. ***Chlorostilbon assimilis* Lawrence.**

*Chlorostilbon assimilis* LAWRENCE, Ann. Lyc. N. Y., VII, 292 (Lion Hill, Panama [M' Leannan]). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 44 (Boruca). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 54 (Chiriquí and Panama). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 265 (Chiriquí and Panama). — HARTERT, Tierr., 1900, 76 (Panama). — BANGS, Auk, XXIV, 1907, 295 (Boruca).

Acad. Nat. Sci. Philadelphia: Dota Mountains (Underwood).

Carnegie Museum: Boruca and Buenos Aires de Térraba (Carriker).

Four skins.

Lawrence records this species from Cartago, but I cannot think that he was right, although it is possible that it may have straggled that far up. Its Costa Rican range seems to be confined to the southwestern Pacific coast region, embracing the Térraba Valley and a part of the Dota Mountains. I saw numerous individuals in the hills above Boruca and around Buenos Aires, always in the second-growth scrub or in the shrubbery around the borders of the "sabanas."

249. ***Panterpe insignis* Cabanis and Heine.**

*Panterpe insignis* CABANIS and HEINE., Mus. Hein., III, 43. — CABANIS, Jour. für Orn., 1862, 164 (San José [Hoffman]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 124 (La Candelaria [Frantzius], Irazú [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 316 (Irazú [Cooper]). — BOUCARD, P. Z. S., 1878, 71 (Irazú). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 317 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Faldas de Irazú). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 158 (Volcan de Cartago [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 283 (Costa Rica and Chiriquí). — HARTERT, Tierr., 1900, 82 (Costa Rica and Chiriquí). — BANGS,



Proc. N. Eng. Zool. Club, 1908, 25 (Volcan de Irazú, Dec. 8, 1906, ♂ —melanistic individual [Underwood]).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), Volcan de Póas and Coliblanco (Ridgway), Las Vueltas de Dota (Basulto).

Bangs Collection: Irazú (Underwood).

C. H. Lankester Collection: Volcans de Irazú, Póas, and Turrialba.

Carnegie Museum: Volcans de Irazú and Turrialba and Ujurrás de Térraba (Carriker).

This handsome species is confined to the high mountains of Costa Rica and Chiriquí, rarely being found below 6,000 feet, and most abundantly on the high volcanoes just below timber-line. It is exclusively a bird of the forest, preferring the most humid conditions.

### 250. *Thalurania colombica venusta* (Gould).

*Ornismya colombica* BOURCIER, Ann. Soc. Phys. et Nat. Lyon, VI, t. 6 (Colombia).

*Thalurania venusta*, GOULD, P. Z. S., 1852, 9 (Chiriquí). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 122 (Angostura [J. Carmiol], Tucurríqui [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 315 (Angostura and Tucurríqui).

*Thalurania colombica* BOUCARD, P. Z. S., 1878, 69 (San Carlos and Juan Viñas). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 313 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Naránjo de Cartago, Jiménez). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 79, *part* (Tucurríqui). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 266 (Costa Rica). — HARTERT, Tierr., 1900, 86, *part* (Middle America).

*Thalurania columbica venusta* BANGS, Auk, XXIV, 1907, 296 (Boruca, El Pózo and Barranca de Térraba (Underwood)).

U. S. Nat. Museum: Bonilla and Guayábo (Ridgway and Zeledón) (Basulto).

Bangs Collection: Carrillo, Cariblanco, Pózo Azul (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí, Banana River.

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Pózo Azul de Pirrís, Rio Sicsola, Cuábre, El Pózo de Térraba, Boruca, Tucurríqui, El Hogar, Ciruélas, Guácimo (Carriker). Thirty-eight skins.

I quite agree with Mr. Bangs in setting up Cabanis' name for the birds of this species from Costa Rica and Chiriquí, as, while the differences are small, they are quite constant (in adult birds). Costa Rican birds show much more blue on the back than specimens from Santa Marta; the rump is darker and the tail deeper purple. The

Costa Rican females may be distinguished by the much greater amount of green and dusky on the breast and abdomen.

The bird is found over the whole of the lowlands of both the Caribbean and Pacific slopes, and even extends up to 3,000 feet or more on the eastern slope. It appears to be more abundant in southern Costa Rica (on both sides) than in the north, although it is quite numerous in the Santa Clara Valley (Caribbean). It is a bird of the forest, scarcely ever leaving it, and feeds extensively on the flowers of the "wild plantain."

### 251. *Eupherusa egregia* Sclater and Salvin.

*Eupherusa egregia* SCLATER & SALVIN, P. Z. S., 1868, 389 (Volcan de Chiriquí, Panama). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 146 (critical). — BOUCARD, P. Z. S., 1878, 71 (Navárro). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 318 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Cervántes de Cartago). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 73 (Costa Rica [Carmioli and Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 272 (Costa Rica and Chiriquí). — HARTERT, Tierr., 1900 89 (Costa Rica and Panama).

*Eupherusa eximia* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 127 (Cervántes and Barranca [J. Carmiol]).

U. S. Nat. Museum : Santa Maria de Dota (Basulto), Irazú (Lizáno).

Bangs Collection : Azahár de Cartago and Barba (Underwood).

Fleming Collection : Dota Mountains (Underwood).

Carnegie Museum : Juan Viñas and Ujurrás de Térraba (Carriker).

Five skins.

Restricted to the higher portions of the Caribbean slope and the high mountains of southwestern Costa Rica, where humid conditions are found similar to those present on the Caribbean slope. I found them at Juan Viñas in May, feeding on the blossoms of a mountain species of "wild plantain." It is entirely a woodland bird, rarely coming to the edge of the forest to feed on the flowers there. It is not a common bird even in the most favored localities and one not always taken by collectors.

### 252. *Elvira nigriventris* (Lawrence).

*Eupherusa nigriventris* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1867, 232 (Costa Rica [Endres]); Ann. Lyc. N. Y., IX, 1868, 127 (C. R. [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, Pl. LVII, fig. 3 (♂), 4 (♀).

*Callipharus nigriventris* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 318 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Naránjo de Car-

tago). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 67 (Costa Rica [Carmioli and Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 270 (Cervantes [Cooper], Peorsnada [Zeledón, in U. S. Nat. Mus.]).

*Elvira nigriventris* HARTERT, Tierr., 1900, 90 (Costa Rica and Veragua).

U. S. Nat. Museum : Coliblanco (Ridgway), Bonilla (Basulto).

Bangs Collection : La Hondura and Cariblanco de Sarapiquí (Underwood).

Carnegie Museum : La Hondura (Carriker). One male.

The range of this species extends over the Caribbean slope from an altitude of about 2,000 to 4,000 feet, but it is never a common bird. It is always found in or near the forest, coming out to feed along the edges like the preceding species.

### 253. *Elvira chionura* (Gould).

*Trochilus (Thaumatias ?) chionura* GOULD, P. Z. S., 1850, 162.

*Eupherusa chionura* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 127 (Dota [J. Carmiol]).

*Eupherusa niveicauda* LAWRENCE, Ann. Lyc. N. Y., VIII, 1865, 134 (Dota [J. Carmiol]).

*Elvira chionura* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 318 (Costa Rica).

— ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Costa Rica). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 74 (Costa Rica [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 273 (Costa Rica and Chiriquí). — HARTERT, Tierr., 1900, 90 (Costa Rica and Panama). — BANGS, Auk, XXIV, 1907, 296 (Boruca).

U. S. Nat. Museum : La Lagunaria and Santa Maria de Dota (Basulto).

I did not meet with this species and know nothing about its habitat more than that it has been collected in Costa Rica in the Dota Mountains, probably extending from there down through Chiriquí. It probably has about the same range as does *Eupherusa egregia* on the Pacific slope.

### 254. *Elvira cupreiceps* (Lawrence).

*Eupherusa cupreiceps* LAWRENCE, Ann. Lyc. N. Y., VIII, 1866, 348 (Barranca [J. Carmiol]); IX, 1868, 127 (Barranca [J. Carmiol]).

*Elvira cupreiceps* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 318 (Costa Rica).

— BOUCARD, P. Z. S., 1878, 71 (Juan Viñas). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 75 (Tucurríqui [Arcé], Costa Rica [Endres, Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 273 (Barranca [Zeledón, in U. S. Nat. Mus.]). — HARTERT, Tierr., 1900, 91 (Costa Rica).

U. S. Nat. Museum : Bonilla (Basulto).

Bangs Collection : Cariblanco de Sarapiquí (Underwood).

C. H. Lankester Collection : Juan Viñas and Cariblanco de Sarapiquí.

This species is confined entirely to Costa Rica and thus far has been taken only on the Caribbean watershed between the altitudes of about 1,500 and 3,000 feet. The type of the species, however, was described by Lawrence from a specimen labelled *Barránca*. I do not believe this could have been the Barránca near Puntarenas, but rather the locality where Frantzius collected, and which he describes as having a cool climate, and which is very likely some point on the slopes of the Volcanoes Póas or Barba.

On the Pacific side of the country this species is replaced by the preceding, *E. chionura*, and, while it is possible that the type was collected at Barránca de Puntarenas, it is not at all probable, since conditions are so different there.

### 255. *Chalybura melanorrhoa* Salvin.

*Chalybura melanorrhoa* SALVIN, P. Z. S., 1864, 584 (Tucurríqui [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 122 (Angostura and Pacuare [J. Carmiol]). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 311 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887 (Jiménez). — HARTERT, Tierr., 1900, 93 (Costa Rica and Nicaragua).

*Hypuroptila melanorrhoa* SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 90 (Tucurríqui and Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 276 (Talamanca [Zeledón, in U. S. Nat. Mus.]).

*Chalybura carmioli* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1865, 37 (Angostura [J. Carmiol]).

U. S. Nat. Museum : Bonilla (Ridgway) (Basulto), Jiménez (Alfaro).

Bangs Collection : La Junta, Juan Viñas, Tucurríqui (Underwood).

C. H. Lankester Collection : Siquirres.

Carnegie Museum : Guápiles (Carriker & Crawford); Cuábres, El Hogar, Rio Sicsola (Carriker). Twenty-three skins.

This species is found only on the Caribbean lowlands, ranging from Chiriquí northward into Nicaragua and at an elevation of from sea-level up to 2,000 feet, but most abundantly in the lowlands, below 1,000 feet. It is an inhabitant of the dense forest, being also greatly attracted by the flowers of the "wild plantain." I found them very abundant in the extreme southeastern part of Costa Rica, along the Sicsola river, where one would expect to get *C. isauræ* also, but although I collected a large series of them there, no specimen of *C. isauræ* was taken.

256. *Chalybura isauræ* (Gould).

*Hypuroptila isauræ* GOULD, P. Z. S., 1861, 199 (Boca del Toro, Panama, *vide* Verreaux).—SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 89 (Panama).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 275 (Talamanca, C. R. [Zeledón, in U. S. Nat. Museum]).

*Chalybura isauræ* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 122 (Boca del Toro, Panama).—RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 311 (Costa Rica, specimen in U. S. Nat. Mus.).—HARTERT, Tierr., 1900, 92 (Panama).

Authority for placing this species on the Costa Rican lists rests entirely upon the specimens in the U. S. National Museum, collected by Zeledón in Talamanca, as recorded by Mr. Ridgway (Proc. U. S. Nat. Mus., III, 311) and cited by Salvin and Godman (Biologia, 276).

It is not at all improbable that it might be taken in the extreme southeastern portion of the country, since the type came from Boca del Toro, which is only about twelve miles from Costa Rican territory. The bird is exceedingly rare throughout its entire range, except in Chiriquí, and would be easily overlooked.

257. *Colibri delphinæ* (Lesson).

*Ornismya delphinæ* LESSON, Rev. Zool., 1839, 44.

*Pelasophora delphinæ* SALVIN, Ibis, 1869, 319 (Costa Rica [J. Carmiol]).—SCLATER and SALVIN, P. Z. S., 1870, 837 (C. R. [J. Carmiol]).—SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 111 (C. R. [Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 282 (Guatemala to S. A.).

*Colibri delphinæ* HARTERT, Tierr., 1900, 93 (Guatemala to S. A.).—BANGS, Auk, XXIV, 1907, 296 (Boruca, one ♂ [Underwood]).

U. S. Nat. Museum: Bonilla (Basulto).

Bangs Collection: San Pedro del Mojón and Escazú (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Escazú and Miravalles (Carriker). Three skins.

A common bird in a few localities, probably most so in the vicinity of San Pedro del Mojón, where Underwood has taken many specimens. Its Costa Rican range seems to cover the greater portion of the country, specimens having been collected on the Pacific coast lowlands at northern and southern points, in the interior or plateau region, and on the Caribbean slope down to at least 1,500 feet above sea-level.

It frequents open woodland, isolated trees, shrubbery, etc., its habits being much like those of the genera *Amizilis* or *Floricola*.

258. *Colibri cyanotus cabanidis* (Heine).

*Petasophora cabanidis* HEINE, Jour. für Orn., 1863, 182.

*Petasophora cabanisi* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 126 (name proposed for Costa Rican form of *P. cyanotus*).

*Petasophora cyanotis* CABANIS, Jour. für Orn., 1863, 162 (C. R. [Frantzus]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 125 (Barranca and Dota [J. Carmiol], Cartago [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 317 (Slopes of Irazú, Los Tabacáles, Cartago, and Dota Mts.). — BOUCARD, P. Z. S., 1878, 69 (Volcan de Irazú, 8000 feet, common). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 311 (Costa Rica); V, 1882, 500 (San José [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Faldas de Irazú). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 110 (Orósi [Kramer], Irazú [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 282 (Las Cruces de Candelaria [Zeledón]).

*Colibri cyanotus* HARTERT, Tierr., 1900, 94 (Costa Rica into S. A.).

*Petasophora cyanotus cabanidis* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 30 (Chiriquí).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San Juan de Irazú (Ridgway), El Copey de Dota (Basulto), La Estrella de Cartago and Volcan de Irazú (Cherrie).

Bangs Collection: La Candelaria, Volcan de Irazú, Escazú (Underwood).

Carnegie Museum: Volcan de Irazú, Volcan de Turrialba, La Estrella de Cartago (Carriker). Eight skins.

Mr. Bangs tells me that he and Mr. Ridgway went very carefully over a large series of specimens from South America, Costa Rica, and Chiriquí, and that the birds from the latter two regions are quite distinct from the South American and Mexican specimens, as has been pointed out both by Cabanis and Lawrence, but not recognized by writers since that time.

Confined to the mountains of the interior, rising above the general level of the central plateau, that is from about 5,000 feet up to timberline on the volcanoes. It is generally confined to the forests, but is also abundant in the pastures among the scattered trees and in the shrubbery along the edges of the forest.

259. *Anthracothorax prevosti prevosti* (Lesson).

*Trochilus prevosti* LESSON, Hist. Nat. Col., 87, pl. 24.

*Lampornis prevosti* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (Gulf of Nicoya [Coll. O. Salvin]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (C. R.). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 98 (Bebedéro [Arcé], C. R. [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 278 (Mex-

ico to Venezuela). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 517 (San Carlos, rather common). — HARTERT, Tierr., 1900, 98 (Mexico to Venezuela).

U. S. Nat. Museum : Rio Turubáles (Ridgway).

Bangs Collection : San Pedro del Mojón, Bebedéro (Underwood).

C. H. Lankester Collection : Bagáces.

Carnegie Museum : Bebedéro (Carriker). One male.

Rather a rare bird in Costa Rica, apparently confined almost entirely to the region about the shores of the Gulf of Nicoya, although Underwood took at least one specimen at San Pedro near San José, while Richmond reports it fairly abundant about San Carlos, near the eastern end of Lake Nicaragua. I know nothing of interest concerning its habits or habitat, although I believe it does not go into the forest, frequenting the gardens, hedgerows, road-sides, etc.

#### 260. *Eugenes spectabilis* (Lawrence).

*Heliomaster spectabilis* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 472 (Costa Rica [Garcia]).

*Eugenes spectabilis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 121 (Rancho Redondo [J. Carmiol]). — SALVIN, Ibis, 1869, 316 (C. R.). — FRANTZIUS, Jour. für Orn., 1869, 315 (C. R.). — BOUCARD, P. Z. S., 1878, 68 (Volcan de Irazú, rare). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 312 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Faldas de Irazú). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 304 (Irazú [Rogers & Arcé], Costa Rica [Carmiol & Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 330 (Costa Rica). — HARTERT, Tierr., 1900, 113 (Costa Rica).

U. S. Nat. Museum : Volcan de Turrialba and Coliblanco (Ridgway), San Juan de Irazú (Ridgway and Alfaro) (Cherrie), Burgos de Irazú (Castro).

Bangs Collection : Volcan de Irazú and El Cerro de Candelaria (Underwood).

C. H. Lankester Collection : Volcanoes de Irazú and Póas.

Carnegie Museum : Escazú, Volcan de Turrialba, and Ujarrás de Térraba (Carriker). Six skins.

This handsome large species is confined entirely to the forests of the high mountains above 6,000 feet, although I believe a few stragglers have been taken as low as 5,000 feet. It is fond of wet forests, and is usually to be found along little mountain creeks and rills. I found it fairly common in the high mountains of southern Costa Rica, at about 8,000 feet, but the forest there was so dense and so choked with undergrowth, ferns, bamboo, and moss, that collecting was very difficult.

261. *Cœligena hemileuca* (Salvin).

- Oreopyra hemileuca* SALVIN, P. Z. S., 1864, 584 (Tucurríqui and Turrialba [Arcé]).  
 — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 125 (citation of Salvin's record).  
 — FRANTZIUS, Jour. für Orn., 1869, 316 (Candelaria and Rancho Redondo).  
 — BOUCARD, P. Z. S., 1878, 69 (Juan Viñas, very rare).  
*Cœligena hemileuca* ELLIOT, Synop. Troch., 31. — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 310 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Naránjo de Cartago). — HARTERT, Tierr., 1900, 115 (Costa Rica).  
*Delattria hemileuca* SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 311 (Turrialba and Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 337 (Costa Rica [Endres, Zeledón, and Alfaro, in U. S. Nat. Mus.]).

Bangs Collection : La Hondura and Cariblanco de Sarapiquí (Underwood).

C. H. Lankester Collection : Cariblanco de Sarapiquí.

Carnegie Museum : La Hondura and Juan Viñas (Carriker). Two skins.

This species is confined entirely to Costa Rica and occupies the higher portions of the Caribbean watershed in the more northerly part of the country, that is between about 2,000 and 4,000 feet above sea-level. It is not a species of the forest, strictly speaking, but frequents scattered trees in pastures, coffee-plantations, the edges of the forest, etc. It is very fond of the flowers of the "guava" tree.

262. *Oreopyra cinereicauda* Lawrence.

- Oreopyra cinereicauda* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 485; IX, 1868, 125 (Garcia Collection, no locality). — BOUCARD, P. Z. S., 1878, 68 (Navárrro, rare). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (C. R.).  
 — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 307 (Costa Rica [Carmioll]).  
 — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 333 (Costa Rica).  
*Oreopyra leucaspis cinereicauda* HARTERT, Tierr., 1900, 117 (Costa Rica).

U. S. Nat. Museum : El Copey, Las Vueltas, Los Reyes, La Lagunaria and Santa Maria de Dota, thirty-three specimens (Basulto).

Bangs Collection : Dota Mountains (Underwood).

Carnegie Museum : Escazú, two ♂; Ujurrás de Térraba, ten specimens (Carriker).

There is no question that *O. cinereicauda* is a very distinct species and not at all subspecifically related to *leucaspis*, as given by Hartert (Tierr., 117).

It is confined to the southwestern portion of Costa Rica and northwestern Chiriquí, inhabiting only the higher altitudes, probably not



below 6,000 feet. Basulto found it very abundant in the Dota Mountains, and in fact almost all the specimens of the species which have been collected have come from that region, Boucard taking but one bird at Navarro, which lies southeast of Cartago. I found it fairly common near the tops of the mountains above Ujurrás de Térraba. It is strictly an inhabitant of forests, seldom, if ever, leaving the cool dark depths of the moisture-laden jungles of that region.

263. *Oreopyra castaneiventris calolæma* (Salvin).

*Oreopyra calolæma* SALVIN, P. Z. S., 1864, 584 (Volcan de Cartago [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 125 (Rancho Redondo [J. Carmiol], Las Cruces de Candelaria [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 316 (La Candelaria). — BOUCARD, P. Z. S., 1878, 69 (Juan Viñas, Navarro, Rancho Redondo). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 310 (Costa Rica); V, 1882, 500 (San José, purchased [Nutting]). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 307 (Vol. de Irazú [Rogers and Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 333 (Peorsnada and Las Cruces de Candelaria [Zeledón]). — HARTERT, Tierr., 1900, 117 (Costa Rica and western Andes from Panama).

*Oreopyra venusta* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 484 (Garcia Collection from C. R.).

*Anthocephala castaneiventris* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 124 (La Candelaria [Frantzius], San José [J. Carmiol], Irazú [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 316 (Rancho Redondo).

*Panterpe insignis* LAWRENCE, Ann. Lyc. N. Y., VIII, 1866, 45 (female of *O. c. calolæma* described as the female of *P. insignis*).

*Oreopyra pectoralis* SALVIN, Ann. & Mag. of N. H., VII, 1891, 377 (Costa Rica [Endres]); Cat. Birds Brit. Mus., XVI, 1892, 308 and 664 (Costa Rica [Endres]).

*Oreopyra calolæma pectoralis* HARTERT, Tierr., 1900, 117 (Costa Rica).

*Oreopyra castaneiventris calolæma* BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 105 (critical).

U. S. Nat. Museum: Coliblanco (Ridgway and Zeledón), El Copéy de Dota (Basulto), Irazú (Alfaro), Cartago (Alfaro).

Bangs Collection: Azahár de Cartago, Volcan de Irazú, Candelaria Mts., Escazú (Underwood).

C. H. Lankester Collection: Vara Blanca de Sarapiquí.

Carnegie Museum: Escazú, five ♂ and one ♀; La Hondura, two ♂ and one ♀; Juan Viñas, one ♀ (Carriker). Ten skins.

The genus *Oreopyra* has always been a puzzling one, and many attempts have been made to straighten out the status of the different species, with more or less success, but the arrangement made by Mr.

*O. Bangs* (Proc. Biol. Soc. Wash., XIX, 1906, 105) seems to me to best represent the real state of affairs. M. Eugene Simon also says that he agrees with this same arrangement, except that he recognizes *O. pectoralis* as a good species, to which neither Mr. Bangs nor I can agree. As Mr. Bangs says, *O. leucaspis* is antedated by *O. castaneiventris* Gould, and *O. calolæma* is clearly only subspecifically distinct from it, true *castaneiventris* being restricted to Chiriquí.

As to *O. pectoralis*, I believe that the few specimens which have been taken (certainly not more than four or five males, the females not entering into the question at all, being indistinguishable from females of *O. calolæma*) and called that, are nothing more than peculiar cases of partial melanism in *O. calolæma*, or rather one of those peculiar color aberrations which are so frequent in hummingbirds. Very few specimens have ever been taken. It occurs in the same districts as *O. calolæma*, and is so rare that such indefatigable collectors as Zeledón, Cherrie, Alfaro and Underwood have never taken it. In view of all these facts I do not think it can be considered as a normal form.

It is a well-known fact that in feathers having a structure similar to that found in hummingbirds and other groups where brilliant metallic tints are present, the color of the feather is not due to pigments, but to physical structure, causing it to absorb all the colors of the spectrum except that which it reflects, and that the slightest derangement of this structure following certain lines will cause the feather to lose its bright metallic sheen and appear dull black. A striking case in point is a specimen in the collection of Mr. Bangs, that of a melanistic individual of *Panterpe insignis*. This bird still retains the "color pattern" of the normal bird, but the brilliant, glowing metallic sheens which are so much in evidence in that species have been entirely lost, and the whole bird has a very dull, sooty-black appearance, slightly purplish in some lights. This bird was taken among numerous normal individuals, and its color can be attributed to no cause other than that stated above.

*O. castaneiventris calolæma* is found throughout the highlands of central and northern Costa Rica, from about 3,000 feet upwards, but does not extend into the southern part of the country, its place there seeming to be taken by its near relative *O. cinereicauda*. It is a bird of the forest, but also frequents open woodland, scattering trees in pastures, etc., and I do not think it would be found in dense unbroken forest far from any clearing as is *O. cinereicauda*.

264. *Heliodoxa jacula henryi* Lawrence.

*Heliodoxa henryi* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 403 (Angostura, June 15, 1864, ♀; Tuís, Mar. 14, 1866, ♂ [J. Carmiol]).

*Heliodoxa jacula* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 122 (Angostura and Tuís [J. Carmiol]). — BOUCARD, P. Z. S., 1878, 69 (Juan Viñas and Irazú). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 312 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (Birrís de Cartago). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 319, *part* (Tucurríqui [Arcé], C. R. [Carmiol and Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 339. *part* (Talamanca [Zeledón, in U. S. Nat. Mus.]).

*Heliodoxa jacula henryi* HARTERT, Tierr., 1900, 123 (Costa Rica and Panama), U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Coliblanco and Bonilla (Ridgway), Los Reyes de Dota (Basulto).

Bangs Collection: Volcan de Irazú, Cariblanco de Sarapiquí, San Pedro del Mojón (Underwood).

Fleming Collection: La Hondura, Cariblanco de Sarapiquí and Carrillo (Underwood).

Carnegie Museum: Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Volcan de Irazú, La Hondura, Juan Viñas (Carriker). Ten skins.

This northern or Central American race of *Heliodoxa jacula* occupies in Costa Rica the Caribbean slope from about 1,000 to 4,000 feet, being most abundant between 2,000 and 3,000 feet. It is occasionally taken in the San José Valley and we have one record for the Dota Mountains, where conditions are very similar to those on the Caribbean watershed. It is a semi-woodland species, sometimes found in dense forest, at other times in the open.

265. *Heliothrix barroti* (Bourcier and Mulsant).

*Trochilus barroti* BOURCIER & MULSANT, Rev. Zool., 1843, 72.

*Heliothrix barroti* GRAY, Gen. Birds, I, 115. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 125 (Angostura and Cervantes [J. Carmiol]). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 316 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (C. R.). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 32 (Tucurríqui [Arcel]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 251 (Tucurríqui [Zeledón]). — HARTERT, Tierr., 1900, 187 (Guatemala to Ecuador). — BANGS, Auk, XXIV, 1907, 296 (Paso Real de Térraba [Underwood]).

U. S. Nat. Museum: Bonilla (Ridgway).

Bangs Collection: Carrillo, Jiménez, and Pózo Azul (Underwood).

C. H. Lankester Collection: Cariblanco.

Carnegie Museum: Pózo Azul, La Hondura, Carrillo, Tucurríqui (Carriker). Six skins.

This beautiful species, which has a wide geographical distribution elsewhere, also has a wide range in Costa Rica. It is found over the entire Caribbean lowlands and slopes up to at least 4,000 feet, and throughout the Pacific lowlands, but does not ascend on that side to more than 1,000 or 1,500 feet above sea-level. It is most abundant on the Caribbean side between 1,000 and 2,500 feet, frequents only the heavy forests, and as a rule feeds among the tree-tops, on flowering vines and parasitic orchids. It is, as a rule, very shy and difficult to shoot, being rapid in movement and keeping well up among the trees.

266. *Floricola superba superba* (G. Shaw).

*Oiseau-Mouche á long Bec* AUDEBERT & VIEILLOT, Ois. dor., I, 1802, 128, pl. 59.

*Trochilus superbus* G. SHAW (& NODDER), Nat. Miscel., XIII, pl. 517.

*Heliomaster longirostris* SALVIN, Ibis, 1869, 316 (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 126 (Costa Rica [Enrique Arcé], Coll. O. Salvin.). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 313 (Costa Rica).

*Floricola longirostris* ELLIOT, Syn. Troch., 83. — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 229 (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 304 (Bebedéro and Tucurriquí [Arcé]; C. R. references). — CHERRIE, Auk, IX, 1892, 324 (San José); Expl. Zool. en C. R., 1891-2, 1893, 45 (Boruca and Térraba).

*Heliomaster sclateri* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 126 (San José [Frantzius], Angostura [J. Carmioll]).

*Heliomaster pallidiceps*, LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 126 (Gulf of Nicoya [Arcé], Coll. O. Salvin).

*Floricola superba (typica)* HARTERT, Tierr., 1900, 192 (Central America south to the Amazons). — BANGS, Auk, XXIV, 1907, 296 (Boruca, Paso Real, and Barránca [Underwood]).

Bangs Collection: San Pedro, Cerro de Candelaria, Pózo Azul de Pirrís, San José (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles (Carriker & Crawford), Escazú, La Hondura, El Pózo de Térraba, Boruca (Carriker). Eleven skins.

Costa Rican specimens of *F. superba* show no signs of the bright green crown of *F. superba pallidiceps* as found in Mexican specimens, the crown being brilliant blue of almost the same shade as is found in birds from Santa Marta. There is a slight tendency to a paler shade of blue than in typical *superba*, but again some Costa Rican birds have as vivid a blue crown as the southern specimens. There is a tendency in a few birds towards a lilac-tinged throat, and a paler crown, which may be a slight intergradation between *F. superba* and *F. pallidiceps*,

or it may be only a case of aberrancy. All specimens with such a tendency are slightly immature birds, with the bright crown- and throat-feathers only partially assumed, and it may be that with the full development of these feathers they assume the normal shade of color.

This species is found over the Caribbean lowlands, the plateau region, and southwestern Costa Rica, from Pózo Azul southward. It is particularly abundant in the Térraba Valley, where it feeds on the flowers of the "guava" tree in company with *Saucerrottia niveiventris* and others. It is difficult to secure males in full plumage, nearly all birds secured lacking some or all of the brilliant feathers of the throat or crown. It is not a bird of the forests, but lives in scattered trees, along rivers and roadsides. It is a very swift flyer, even for a hummingbird, and as a rule feeds high up.

267. *Floricola constanti constanti* (Delattre).

*Ornismya constantii* DELATTRE, Echo du Monde Savant, 1843, 1069.

*Heliomaster constanti* CABANIS, Jour. für Orn., 1862, 165 (C. R. [Frantzius]).—

LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 126 (C. R. [J. Carmiol, Frantzius]).

—FRANTZIUS, Jour. für Orn., 1869, 317 (vicinity of San José).

*Floricola constanti* ELLIOT, Syn. Troch., 84. —BOUCARD, P. Z. S., 1878, 69 (San José). —ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (San José). —

SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 231 (Bebedéro [Arcé]). —SALVIN

and GODMAN, Biol. Centr.-Am. Aves, II, 1892, 306 [Tempate [Arcé]]. —

CHERRIE, Auk, IX, 1892, 324 (San José). —UNDERWOOD, Ibis, 1896, 442

(Miravalles). —HARTERT, Tierr., 1900, 193 (Costa Rica to Guatemala).

U. S. Nat. Museum : San José and San Pedro del Mojón (Alfaro).

Bangs Collection : San José and San Pedro del Mojón (Underwood).

C. H. Lankester Collection : Miravalles, Bebedéro, Alajuéla.

Carnegie Museum : Bebedéro, Bagáces, Miravalles (Carriker). Nine specimens.

This *Floricola* seems to be confined to the region of the central plateau and Guanacaste, from the Tempisque River up to about 2,000 feet on the Volcan de Miravalles. I have never seen it in the Caribbean lowlands, nor in the southwestern part of the Pacific lowlands, where it is replaced by *F. superba superba*. Like the other species of the genus, it keeps more to the open, in gardens and pastures.

268. *Calliphlox bryantæ* (Lawrence).

*Doricha bryantæ* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 483 (Costa Rica [J.

Carmiol]); IX, 1868, 123 (Dota [J. Carmiol], Las Cruces de Candelaria

[Zeledón]). —FRANTZIUS, Jour. für Orn., 1869, 316 (C. R.). —BOUCARD, P.

Z. S., 1878, 70 (San José and Volcan de Irazú). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 315 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (El Naránjo de Cartago). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 384 (Costa Rica [Endres and Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, II, 1892, 347 (Costa Rica and Panama).

*Calliphlox bryantæ* HARTERT, Tierr., 1900, 198 (Costa Rica and Panama).

U. S. Nat. Museum : Volcan de Irazú (Lizáno).

Bangs Collection : Volcan de Irazú, Escazú, and San Pedro del Mojón (Underwood).

C. H. Lankester Collection : Cachi.

Carnegie Museum : Volcan de Irazú (Carriker). Three skins.

This bird is rather closely related to, and has the habits of *Selasphorus*, ranging over the higher portions of the plateau region, and up the volcanoes to almost timber-line. It is most abundant, however, from about 4,000 to 6,000 feet, frequenting shrubbery, the edges of forests, bushy pastures, and roadsides, and usually keeps near the ground.

#### 269. *Trochilus colubris* Linnæus.

*Trochilus colubris* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 120. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 123 (Las Cruces de Candelaria [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 315 (La Candelaria, November). — BOUCARD, P. Z. S., 1878, 70 (San José, one — rare). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 314 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (C. R.). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 399 (Bebedéro [Arcé], C. R. [Gould Coll.]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 357 (C. R. references). — CHERRIE, Auk, IX, 1892, 324 (San José, very rare visitant). — UNDERWOOD, Ibis, 1896, 442 (Bagáces). — HARTERT, Tierr., 1900, 201 (Mexico to Veragua in winter).

U. S. Nat. Museum: Santo Domingo de San Mateo, Feb. (Alfaro).

Bangs Collection: San Pedro del Mojón, October, 1897, 1899, 1904 and 1906, seven specimens (Underwood).

Carnegie Museum: Juan Viñas, March 17 and 18, 1902, two ♂; Volcan de Irazú, April 3, 1902, ♂ juv. (Carriker).

The Ruby-throated Hummingbird is probably a regular, though rare, winter visitant in Costa Rica, arriving sometime in October and probably leaving the latter part of March or first week in April. It does not descend into the Caribbean lowlands, but keeps to the plateau region and Guanacaste, in the northwestern part of the country. Its habits while there seem to be the same as in the north.

## Genus SELASPHORUS.

The Central American members of this genus have been in a very unsatisfactory condition for some time, owing to lack of material and perpetuated errors. While preparing this paper I asked M. Eugene Simon to give me his opinion upon the status of several of the species, which he has very kindly done, including all of the Central American species. M. Simon is well qualified to straighten out this tangle, not only on account of his long study of the *Trochilidæ*, but from the large amount of material in his own collection and in the British Museum, to which he has had access.

The arrangement of the species here given follows that which he has furnished me.

270. *Selasphorus flammula flammula* Salvin.

*Selasphorus flammula* SALVIN, P. Z. S., 1864, 586 (Volcan de Irazú [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868 (Irazú [Arcé]). — FRANTZIUS, Jour. für Orn. 1869, 315 (Los Tabacáles, La Candelaria). — BOUCARD, P. Z. S., 1878, 70 (summit of Volcan de Irazú). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (C. R.). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 398 (Volcan de Irazú [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 357 (Irazú and Rancho Redondo [Zeledón, in U. S. Nat. Mus.]). — HARTERT, Tierr., 1900, 205 (high mts. of Costa Rica).

*Selasphorus flammea*, RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 497 (Irazú [Nutting]).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San Juan de Irazú (Ridgway), Volcan de Irazú (Cherrie) (Lizano).  
Bangs Collection: Volcan de Irazú (Underwood).

C. H. Lankester Collection: Volcan de Irazú and Turrialba.

Carnegie Museum: Volcan de Irazú and Turrialba (Carriker). Five skins.

This is a very distinct and easily recognized species, which is found only on the highest mountains of central Costa Rica. There are many of them among the stunted scrub found above timber-line on the volcanoes, this being the only species occurring in any numbers at so high an altitude in Costa Rica.

271. *Selasphorus flammula torridus* (Salvin).

*Selasphorus torridus* SALVIN, P. Z. S., 1870, 208 (Volcan de Chiriquí, Panama [Arcé]). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 415 (Costa Rica, ♂ and ♀ [Van Patten coll.]); VII, 1884, 14 (C. R. [Van Patten]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Volcan de Irazú, three). — SALVIN,

Cat. Birds Brit. Mus., XVI, 1892, 395 (Volcan de Chiriquí [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, II, 1892, 354 (Volcanoes de Irazú and Chiriquí). — HARTERT, Tierr., 1900, 206 (Volcan de Chiriquí, Panama).

Bangs Collection: Volcan de Irazú, two, ♂, ♀; Dota Mts., ♂ juv. (Underwood).

M. Simon says of this form that it is absolutely the same as *S. flammula* with the single exception of the color of the throat, and should be considered only a subspecies of that form. “*S. torridus* Salv. ne diffère absolument de *S. flammula* que par la teinte de la gorge et il serait mieux de le considerer comme subspecies.”

I have never seen any males from the Volcan de Chiriquí, only females in Mr. Bangs' collection, but it seems quite probable that all of the birds there might be of this form. The fact that specimens of the variety *S. f. torridus* have been taken on Irazú in company with true *S. flammula* is rather hard to explain, providing one recognizes *S. torridus* as a subspecies of *S. flammula*. It is possible that the birds from Irazú are faded or stained specimens of *flammula*, while those occurring farther south are true *torridus*. The young male from the Dota mountains is undoubtably true *torridus*, for the lilac feathers are just coming out and are the proper color for *torridus*. A good series of males from the Volcan de Chiriquí would clear up this question quite thoroughly.

The bird is found only at high altitudes, usually at or above timberline.

#### 272. *Selasphorus scintilla* (Gould).

*Trochilus (Selasphorus) scintilla* GOULD, P. Z. S., 1850, 162 (Volcan de Chiriquí). *Selasphorus scintilla* GOULD, Mon. Troch., III, t. 138 (May, 1852). — CABANIS, Jour. für Orn., 1862, 165 (Costa Rica, Frantzius). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 123 (Barránca [F. Carmiol], Cervántes [J. Carmiol], Las Cruces de Candelaria [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 315 (Los Tabacáles, Irazú, and Candelaria). — BOUCARD, P. Z. S., 1878, 70 (Cartago and Volcan de Irazú). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 121 (C. R.). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 395 (Irazú [Rogers], Barránca [Carmiol], Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 353 (C. R. references). — HARTERT, Tierr., 1900, 206 (Costa Rica and Panama).

U. S. Nat. Museum: Coliblanco and Volcan de Turrialba (Ridgway), El Copey, La Lagunaria, San Lucas, and Santa Maria de Dota (Basulto).

Bangs Collection: Escazú, San Pedro del Mojón, Cerro de Candelaria (Underwood).



Carnegie Museum: Escazú, La Hondura, La Estrella de Cartago, Ujurrás de Térraba, Juan Viñas (Carriker). Ten skins.

This is the common and most abundant species of *Selasphorus* in Costa Rica, found almost everywhere over the central plateau above 3,500 or 4,000 feet, and up to the summits of the high volcanoes, where it mingles with *S. flammula*. Its habits are about the same, keeping in the low trees and shrubbery, buzzing about like a big bumblebee, and darting from one flower to another; and, when tired, perching on a tiny twig in the same bush with the flowers upon which they are feeding, or near by it.

273. *Selasphorus underwoodi* Salvin.

*Selasphorus underwoodi* SALVIN, Ibis, 1897, 441 (Volcan de Irazú [Underwood]); Bull. Brit. Orn. Club, Vol. VI, p. xxxviii.

M. Simon says of this species: "Je ne possède pas *S. underwoodi* Salvin, mais j'ai vu à Londres le type décrit par Salvin, envoyé par Underwood du Volcan de Irazú, et un autre ♂ de la collection Rothschild à Tring. Cette espèce est tout-à-fait proche de *S. scintilla*, mais très différente de *S. ardens*. Elle diffère seulement de *S. scintilla* par les rectrices medianes à bande noire mediane beaucoup plus large, les rectrices externes noir-violâtre dans leur moitié externe, rousses dans l'interne, mais avec une longue tache submediane noir-violâtre, aussi la gorge rouge-orangée un peu moins brillante."

When Salvin described this bird he compared it with *S. ardens*, from which it is quite different, greatly resembling *S. scintilla*, from which it differs only in the color of the tail and a different shade of color on the throat. In *S. scintilla* the middle rectrices have a narrow median stripe of violet-black, with the outer rectrices without any of this color on the outer web. In *S. underwoodi* the median stripe on the middle rectrices is broader (about twice the width) and the median portion of the outer web of the outer rectrices has a patch of the same color as the inner web; the color of the gorget is a little more brilliant orange-red.

Mr. Bangs and myself have examined a large series of males of *S. scintilla*, and while there were none of them exactly as the type of *S. underwoodi*, there were several specimens approaching it, having the median stripe on the middle rectrices broader, and with an indication of the patch on the outer web of the outer rectrices.

Considering these facts I do not believe *S. underwoodi* to be any-

thing more than an extreme variation in the tail-markings of *S. scintilla*. Ordinary specimens of *scintilla* exhibit a great range of shade in the color of the gorget, so that this character is of little value. Having never seen the type of *S. underwoodi*, I do not feel justified in reducing the species to a synonym of *scintilla*, but I believe that further investigation will prove it to be such.<sup>1</sup>

274. *Selasphorus simoni* sp. nov.

*Selasphorus ardens* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 314 (Costa Rica) (?); VI, 1883, 415 (Costa Rica, ♂ [Van Patten Coll.]); VII, 1884, 14 (see *antea.*). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 356, *part* (Volcan de Póas [Alfaro], and Las Cruces de Candelaria [Zeledón, in Coll. U. S. Nat. Mus.]).

*Selasphorus underwoodi* HARTERT, Tierr., 1900, 206.

Bangs Collection : Volcan de Barba (Underwood).

C. H. Lankester Collection : Volcan de Póas.

Type, No. 16879, Coll. E. A. & O. Bangs, collected by C. F. Underwood, Volcan de Barba, Costa Rica, Oct., 1900.

Similar to *S. ardens* of Panama, but differing in the following characters : The rusty-red edging of the middle rectrices is much narrower, the bill is shorter, and the under tail-coverts are cinnamon-ochraceous instead of white, slightly edged with pale fawn-color. Salvin gives the measurements of *S. ardens* as : wing, 38 ; tail, 29 ; bill, 16 mm. Seven males of *S. simoni* average: wing, 40 ; tail, 28 ; bill, 10.7 mm.

M. Simon says of *S. simoni* "*S. ardens* Salvin est tout-a fait distinct et diffère de toutes les autres par les sous-caudales longues, blanches, un peu teintées de fauve pâle au disque. Ce caractère important n'a pas été indiqué par Salvin, parceque les oiseaux d'Arcé n'ont pas de ventre ni de sous-caudales.

"Enfin une autre espèce qui a été répandue partout sous le nom de *S. ardens* par Underwood a été indiquée par Hartert sous le nom de *S. underwoodi* (non Salvin), elle se trouve seulement à Barba."

Thus it will be seen that the bird which in Costa Rica has long been known under the name of *S. ardens* is not that form at all, but has been without a name up to now. M. Simon has very courteously

<sup>1</sup> Having had occasion to look into the matter I discover that in the series of ten specimens collected by Mr. Carriker, and listed under No. 272 as *S. scintilla*, there are several which agree absolutely with the diagnosis of *S. underwoodi* Salvin, as given above by Mons. Simon. — W. J. Holland.

advised me of this fact after investigating the matter, and I have accordingly named the new form in his honor.

*S. simoni* seems to be fairly common on the Volcan de Barba and has also been taken occasionally in other localities. Its altitudinal range seems to be the same as that of *S. flammula*, or perhaps a trifle lower.

275. **Klais guimeti** (Bourcier and Mulsant).

*Trochilus guimeti* BOURCIER & MULSANT, Ann. Soc. Phys. et Nat., VI, 38, t. 2.

*Klais guimeti* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 145 (Costa Rica [Endres]).

— BOUCARD, P. Z. S., 1878, 69 (Navárrro). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 317 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Navárrro de Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 45 (Boruca and Térraba). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 359 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 343 (Navárrro [Cooper, in U. S. Nat. Mus.]).

*Clais guimeti* HARTERT, Tierr., 1900, 214 (Central and Northern South America). — BANGS, Auk, XXIV, 1907, 296 (Boruca [Underwood]).

U. S. Nat. Museum: Bonilla (Basulto) (Ridgway and Zeledón).

Bangs Collection: San Pedro del Mojón, Carrillo (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Carrillo, Miravalles, Buenos Aires de Térraba (Carriker). Six skins.

This species is pretty well distributed over Costa Rica, although not common as high up as the central plateau region, Underwood's birds from San Pedro being the only record for that altitude. On the Caribbean slope it ranges from about 1,200 feet up to 3,000 or a little higher, and on the Pacific side I only know of it having been taken at Miravalles (1,500 feet) and in the Térraba Valley (1,000 to 1,500). It is altogether a woodland species, not at all conspicuous, and probably not abundant anywhere.

276. **Microchera parvirostris** (Lawrence).

*Panychlora parvirostris* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1865, 39 (Angostura [J. Carmiol]).

*Microchera parvirostris* SALVIN, P. Z. S., 1867, 154 (Tucurríqui [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 122 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für. Orn., 1869, 315 (C. R.). — BOUCARD, P. Z. S., 1878, 69 (C. R. — very rare). — RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 314 (Angostura); VI, 1883, 415 (Rio Súcio, Cooper). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Rio Súcio). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 67 (Tucurríqui [Arcé], Valsa [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 269 (Nicaragua and Costa Rica). — HARTERT, Tierr., 1900, 216 (Nicaragua and Costa Rica).

*Microchera albocoronata* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 122 (Capt. J. M. Dow, *fide* S. F. Baird).

U. S. Nat. Museum: Bonilla (Ridgway, Zeledón, and Alfaro).

Bangs Collection: Carrillo (Underwood).

Carnegie Museum: Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Carrillo (Carriker). Three skins.

This handsome little species, one of the smallest of the family, is found only on the Caribbean watershed, between the altitudes of about 1,000 and 3,000 feet, but is probably most abundant at about 1,500 feet. It is also a woodland species, feeding rather high up in the trees and is not often seen.

I found a nest in the hills above Guápiles in March, 1908, but the eggs were broken while endeavoring to secure it. It was a tiny little thing, built on a small knot on the side of a slender vine, hanging from a large tree. The female was secured.

#### 277. *Lophornis delatirii* (Lesson).

*Ornismya* (*Lophornis*) *delatirii* LESSON, Rev. Zool., 1839, 19.

*Lophornis delatirii* GOULD, Mon. Troch., III, t. 121 (Sept., 1861). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 423 (Panama and Colombia). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 363 (Panama to Peru). — HARTERT, Tierr., 1900, 218 (Panama to Ecuador). — BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 26 (♂ juv., San Pedro, Oct., 1900; 2 ♂'s, San Pedro, Oct., 1906 [Underwood]).

The specimens recorded above by Mr. Bangs are the first and only records for the taking of this species in Costa Rica, which is evidently out of its real range. It can hardly be more than a straggler in Costa Rica, and may not be taken again for a long time.

#### 278. *Lophornis helenæ* (Delattre).

*Ornismya helenæ* DELATTRE, Echo du Monde Savant, 1843, 1068 (Peten (?), Guatemala).

*Lophornis helenæ* GOULD, Mon. Troch., III, t. 123 (Sept., 1855). — SALVIN, Ibis, 1869, 319 (Tucurríqui [Arcé]). — (?) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 145 (C. R. [Endres]). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 425 (Turrialba and Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 364 (El Naránjo [Zeledón, in U. S. Nat. Mus.]). — HARTERT, Tierr., 1900, 219 (Southern Mexico to Costa Rica).

*Paphosia helenæ* BOUCARD, P. Z. S., 1878, 70 (San Carlos).

U. S. Nat. Museum: Bonilla (Ridgway) (Basulto), Guayábo (Ridgway and Zeledón).

Bangs Collection: Guayabál, Cachí, San Pedro, Las Pavas (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Juan Viñas, ♂ and ♀ (Carriker).

This exquisite little bird is found in Costa Rica only on the Caribbean slope from 1,000 feet up to perhaps 4,000 feet, but is never very abundant in any locality. They are fond of feeding at the blossoms of orange-trees.

279. *Lophornis adorabilis* Salvin.

*Lophornis adorabilis* SALVIN, P. Z. S., 1870, 207 (Volcan de Chiriquí). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (San José). — RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 542 (San José [Zeledón]). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 45 (Boruca, common); Auk, IX, 1892, 424 (San José, a single specimen by Zeledón). — SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 425 (Chiriquí). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 365 (Costa Rica and Panama). — HARTERT, Tierr., 1900, 219 (Volcan de Chiriquí and Costa Rica). — BANGS, Auk, XXIV, 1907, 296 (Boruca [Underwood]).

U. S. Nat. Museum: Monte Redondo (Zeledón).

Bangs Collection: San Pedro, Escazú, and Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Juan Viñas (Carriker). One male.

This *Lophornis* occupies a higher portion of the country than the preceding, although their ranges overlap on the upper part of the Caribbean slope. It is found sparingly over the central plateau region and in the southwestern Pacific lowlands, that is, in the hills surrounding Boruca (1,500 feet). It is perhaps more abundant there than anywhere else in the country, or was before Underwood made his trip in 1906, when he seems to have nearly wiped it out, for I saw none the following year. It is always attracted to the flowers of the "guava" tree when any are near.

280. *Popelairia conversi conversi* (Bourcier and Mulsant).

*Trochilus conversi* BOURCIER & MULSANT, Ann. Sc. Phys. et Nat. Lyon, IX, 313 (Colombia).

*Gouldia conversi* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 123 (Tucurríqui [Arcé, Coll. O. Salvin]). — SALVIN, P. Z. S., 1867, 154 (Tucurríqui [Arcé]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (C. R.).

*Prymnacantha conversi*, SALVIN, Cat. Birds Brit. Mus., XVI, 1892, 430 (Tucurríqui [Arcé], Angostura [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 366 (Naránjo de Cartago [Zeledón, in U. S. Nat. Mus.]).

*Popelaria conversi* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 315 (Costa Rica).

*Popelairia conversi (typica)* HARTERT, Tierr., 1900, 223 (Costa Rica to Colombia).

U. S. Nat. Museum : Bonilla (Ridgway) (Basulto).

Bangs Collection : La Hondura, Carrillo, Cariblanco de Sarapiquí (Underwood).

C. H. Lankester Collection : Cachí.

The Costa Rican range of this beautiful species is confined to the Caribbean slope, where it inhabits the cool, damp forests between an altitude of about 1,000 and 3,000 feet. The bird has been taken more abundantly at Carrillo than at any other place, although not a common bird there by any means. It is perhaps present in southeastern Costa Rica, although I have never observed it there.

### Family TROGONIDÆ.

#### KEY TO THE COSTA RICAN SPECIES.

I. ♂ and ♀ with at least a portion of the abdomen and under tail-coverts red or reddish.

a. Two central rectrices bronzy-green, greatly elongated.

*Pharomacrus mocinno costaricensis*, ♂.

aa. Two central rectrices not greatly elongated.

b. Upper parts bright metallic-green or bluish, with or without bronzy shading.

c. Upper parts mostly purplish-blue, mixed with some green on the back; chest dull purplish-black; exposed portion of three outer rectrices pure white.

*Trogon bairdi*, ♂.

cc. Upper parts green or bronzy-green.

d. Size large (wing and tail equal, seldom less than 160 mm.); tail plain-colored, or, if barred, bars very narrow, forming mere lines; no white line between green of chest and red of breast.

e. Tail plain sooty-gray. *Trogon massena*, ♂.

ee. Tail sooty-black, regularly barred with fine white lines (about 4 mm. apart) on most of three outer rectrices.

*Trogon clathratus*, ♂.

dd. Size small (wing not more than 130; tail 140 mm.); green of chest separated from red of breast by a white band; tail black, barred narrowly with white.

e. Red of lower parts deep rich vermilion.

f. Three outer rectrices tipped with white, with the remainder of visible portion evenly, and very finely, barred with black and white.

*Trogon elegans*, ♂.

ff. Three outer rectrices black, without white tips and with narrow white bars far apart.

*Trogon puella*, ♂.

ee. Red of lower parts pale orange. *Trogon underwoodi*, ♂.

bb. Upper parts never green, but either brown, or plain ashy-gray.

c. Upper parts and breast plain ashy-gray.

d. Size large, (wing not less than 160 mm.); red of belly deep scarlet; no white on outer edge of primaries.

e. Tail plain sooty-gray below, without markings; no buffy edging to tertials. *Trogon massena*, ♀.

ee. Three outer rectrices tipped with white, and outer webs faintly blotched with white; tertials edged with buffy-ochraceous. *Trogon clathratus*, ♀.

dd. Size smaller (wing not more than 145 mm.); red of under parts dark orange; outer webs of primaries notched with white; outer rectrices tipped and barred with white on outer web. *Trogon bairdi*, ♀.

cc. Upper parts and breast brown, also two middle rectrices.

d. Brown color dark and rich; red of belly rich vermilion.

e. Tips and outer webs of three outer rectrices (with small portion of inner webs) grayish white, with barring. *Trogon puella*, ♀.

ee. White on three outer rectrices without admixture of gray, and with both webs of apical portion of feather crossed at intervals with narrow black bars. *Trogon elegans*, ♀.

dd. Brown color paler and grayer; belly pale orange.

*Trogon underwoodi*, ♀.

II. ♂ and ♀ without red on any portion of the body; belly yellow.

a. Back and two central rectrices bronzy-green.

b. Pileum and chest, as well as back, bronzy-green; three outer rectrices broadly tipped and closely barred with white.

*Trogon atricollis tenellus*, ♂.

bb. Pileum and throat black or blue-black; yellow of belly darker.

c. Chest metallic blue-green; no blue on rump; three outer rectrices broadly tipped and evenly barred on both webs with white. *Trogon caligatus*, ♂.

cc. Chest slaty-black, like throat and pileum; rump purplish-blue; three outer rectrices broadly tipped with white, but no bars.

*Trogon melanocephalus illætabilis*, ♂.

aa. Back and central rectrices either brown or ashy-gray, never green.

b. Back and chest plain ashy.

c. Wing coverts and tertials with wavy white bars; three outer rectrices tipped and barred on outer web with white.

*Trogon caligatus*, ♀.

cc. Coverts and tertials plain sooty-gray; three outer rectrices broadly tipped, but not barred, with white.

*Trogon melanocephalus illætabilis*, ♀.

bb. Back and chest brown; coverts freckled with dusky and buffy-brown; three outer rectrices broadly tipped and barred on both webs with white.

*Trogon atricollis tenellus*, ♀.

281. *Pharomacrus mocinno costaricensis* Ridgway.

*Trogon pavoninus* TEMMINCK, Pl. Col., 372 (*nec* Spix).

*Pharomacrus mocinno* DE LA LLAVE, Regis. Trim., I, 1831, 48. — SALVADORI, Atti. R. Acc. Sc. Tor., 1868, 183 (Costa Rica [Durando]). — FRANTZIUS, Jour. für. Orn., 1869, 313 (slopes of Volcan de Irazú). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 431 (Costa Rica [Carmioli], San José [Zeledón]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 481 (Guatemala to Chiriquí).

*Pharomacrus paradiseus* CABANIS, Jour. für Orn., 1862, 175 (Costa Rica [Frantzius & Hoffmann]).

*Pharomacrus costaricensis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (El Zarcero de Alajuela, La Palma de San José, Faldas de Irazú).

*Pharomacrus mocinno*, var. *costaricensis* BOUCARD, P. Z. S., 1878, 48 (Volcan de Irazú, Navarro, La Candelaria, Juan Viñas, in fact all the mountains around San José and Cartago).

*Pharomacrus mocinno costaricensis* RIDGWAY, Proc. U. S. Nat. Mus., V, 498 (Irazú [Nutting]).

U. S. Nat. Museum: Volcan de Turrialba, Coliblanco (Ridgway and Zeledón), Volcan de Póas (Zeledón), San Juan de Irazú (Ridgway).

Bangs Collection: Volcan de Irazú (Underwood).

C. H. Lankester Collection: Volcan de Póas and Turrialba.

Carnegie Museum: Escazú, La Hondura (Carriker); La Estrella de Cartago (Francesco Cooper Ulloa). Seven skins.

The Quetzal, as it is known in its native countries, was formerly very abundant throughout the higher portion of the highlands of Costa Rica, being found almost anywhere above 5,000 feet and even lower down wherever forests were found. Now, however, it is not to be found in any numbers in any of the regions where it formerly abounded, except some of the most inaccessible portions of the high volcanoes. It has been hunted so assiduously by the native collectors, for sale to local taxidermists, that birds are now very hard to procure. At the beginning of the breeding season the males are quite noisy, some of the notes being very musical, while others are harsh and discordant. They never leave the dense humid forests in which they live, and feed almost entirely on fruits of various kinds, but are especially fond of that of the "Hira," a tree very abundant at higher altitudes. When feeding the birds usually pluck the fruit on the wing, darting about among the branches in a very graceful manner, never seeming to be bothered by their long tails, but at other times usually sit very quietly, only moving the head slightly now and then, and under such circumstances it is almost impossible to see them.



282. *Trogon elegans* Gould.

*Trogon elegans* GOULD, P. Z. S., 1824, 36 (Guatemala). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 536 (San Lucas, March, 1889 [Alfaro & Cherrie], first record for Costa Rica). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 449 (no C. R. record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 489 (San Lucas [Cherrie & Alfaro]). — UNDERWOOD, Ibis, 1896, 144 (Bagaces).

U. S. Nat. Museum : San Lucas (from Mus. Nac. de C. R.)

Bangs Collection : Bebedéro, ♀; Bagáces, ♂ and ♀ (Underwood).

C. H. Lankester Collection : Mojica, ♂.

Carnegie Museum : Bebedéro (Carriker). One female.

This is the rarest and most locally distributed of all the Costa Rican trogons. The only localities where it has thus far been taken are scattered around the shores of the Gulf of Nicoya and on the island of San Lucas, in the Gulf. I know nothing of note in regard to its habits, but presume they are similar to those of the other allied species of the genus.

283. *Trogon puella* Gould.

*Trogon puella* GOULD, P. Z. S., 1845, 18 (Escuintla, Guatemala). — CABANIS, Jour. für Orn., 1862, 173 (Costa Rica [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118 (Dota and Turrialba [J. Carmiol], San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 312 (Dota Mts. — most common trogon all the year in Candelaria and Dota Mts.). — BOUCARD, P. Z. S., 1878, 48 (Navarro and La Candelaria Mts.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (Naránjo de Cartago and Turrialba). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 452 (San Mateo [Cooper], Dota and Angostura [Carmiol], Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 491, *part* (Mexico to Panama).

U. S. Nat. Museum : Guayábo and Bonilla (Ridgway and Zeledón), Coliblanco (Ridgway), El Copey and Santa Maria de Dota (Basulto).

Bangs Collection : Cedral de Escazú, Azahár de Cartago and Escazú (Underwood).

Fleming Collection : La Candelaria and La Estrella de Cartago (Underwood).

C. H. Lankester Collection : Cachí.

Carnegie Museum : Volcan de Irazú, La Hondura, Juan Viñas, Carrillo, Las Mesas (Carriker); Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Tobósi (Francesco Ulloa Cooper). Thirteen skins.

*T. puella*, the nearest relative in Costa Rica to *T. elegans*, is confined to the mountains of the central portion of the country, or rather to the main continental divide, but is not taken in the Aguacate Mountains or the highlands of the Guanacaste district, where it is replaced by *T. aurantiiventris underwoodi*. As a rule, it is not found below 3,000 feet, although a few straggle down lower (Carrillo and Volcan de Turrialba, 2,000 feet). It is to be found in the heavy forest as well as among scattered trees in pastures and open places.

284. ***Trogon aurantiiventris underwoodi*** (Bangs).

*Trogon aurantiiventris* GOULD, P. Z. S., 1856, 107 (Chiriquí, Panama). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118 (Barránca [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 312 (San Mateo, Guaitíl and San Juan de San José). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 454 (Barránca [J. Carmiol]). — UNDERWOOD, Ibis, 1896, 444 (Miravalles).

*Trogon aurantiiventris* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 491, part.

*Trogon underwoodi* BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 24 (Volcan de Miravalles, Oct. 28, 1895 [Underwood]); Proc. Biol. Soc. Wash., XXII, 1909, 30 (Tenorio, Cerro de Santa Maria [Underwood]).

Carnegie Museum: Miravalles, Bagáces (Carriker). Nine skins.

*Trogon aurantiiventris* Gould, described from Chiriquí, is quite different from Costa Rican birds of the *aurantiiventris* type, as has been clearly pointed out by Mr. Bangs (see description of *T. underwoodi*). The Costa Rican birds are just about intermediate between *T. puella* and *aurantiiventris*, exhibiting shades of color on the abdomen of varying intensity, but never as yellow (orange) as in *aurantiiventris* or as red as in *puella*. Since the ranges of *T. underwoodi* and *T. puella* overlap to a considerable extent, it is obvious that *underwoodi* has its nearest affinity in *aurantiiventris* rather than in *puella*, being a northern race of the former.

It is confined chiefly to the highlands of Nicoya and Guanacáste, the Aguacate Mountains and the western edge of the central plateau region, being found in company with *T. puella* in the latter section, but in small numbers, occurring much more abundantly in Guanacaste than in any other region.

285. ***Trogon atricollis tenellus*** (Cabanis).

*Trogon atricollis* VIEILLLOT, N. Dict. d'Hist. Nat., VIII, 1817, 318. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (Las Trojas, Angostura, Pacuare). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 47 (Lagarto and Boruca). —

SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 493, *part* (C. R. references). — UNDERWOOD, Ibis, 1896, 444 (below Miravalles).

*Trogon tenellus* CABANIS, Jour. für Orn., 1862, 173 (Costa Rica [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 119 (Angostura, Guaitíl, Pacuare and Barránca [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 312 (Costa Rica). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 456 (Barránca and Angostura [Carmiol]).

*Trogon atricollis tenellus* RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 513. — BANGS, Auk, XXIV, 1907, 294 (Boruca and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Pígres (Ridgway and Zeledón), Bonilla (Zeledón).

Bangs Collection: Juan Viñas, Pózo Azul de Pirrís, Bebedéro, Tenorio, La Vijagua (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Térraba, Guácimo, Río Sicsola, Miravalles, El Hogar, Cuáb্রে (Carriker). Seventeen skins.

With the exception of *T. caligatus*, this is the most abundant and widely distributed member of the family in Costa Rica. It is found over the lowlands of both the Caribbean and Pacific from one end of the country to the other, and gets up to 2,000 or 3,000 feet in occasional instances. It is strictly a forest bird, not frequenting the open woodland and scattering trees as does *T. caligatus*, but usually lurking in the thick, dark parts of the forest, and, as a rule, keeping rather near the ground.

I found a nest of this species at El Pózo de Térraba, June 21, 1907. It was in the hollow trunk of a small palm tree, broken off about five feet above the ground, and excavated for a distance of about ten inches. No nest was made beyond the small particles of decayed wood at the bottom of the cavity, upon which lay the eggs. The two eggs were fresh, white in color, slightly glossed, but not polished, and measured:  $26 \times 22$  and  $27 \times 21$  mm.

I have also seen the nest of this species made by digging out a cavity in an old termite nest.

## 286. *Trogon bairdi* Lawrence.

*Trogon bairdi* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 119 (San Mateo, April 1866 [J. Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 313 (San Mateo only, rare). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (Pózo Azul de Pirrís and Las Trojas). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 461 (Chiriquí only). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 47, (Palmar and Boruca). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896,

496 (Costa Rica and Panama). — BANGS, Auk, XXIV, 1907, 294 (Boruca and El Pózo de Térraba [Underwood]).

*Trogon clathratus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 119 (desc. of ♀ of *T. bairdi*, — San Mateo [Cooper]). — FRANTZIUS, Jour. für Orn. 1869, 313 (San Mateo [Cooper]).

U. S. Nat. Museum : Pigres (Ridgway and Zeledón).

Bangs Collection : Pózo Azul de Pirris and El General de Térraba (Underwood).

Carnegie Museum : Pózo Azul de Pirris and El Pózo de Térraba (Carriker). Seven skins.

This beautiful trogon is confined to the southwestern portion of Costa Rica, thence southward into Chiriquí. It has never been taken farther north than Pigres and San Mateo, where it is very rare, but becomes commoner southward, especially in the lower parts of the Térraba Valley. It does not usually go much above 1,000 feet above sea-level. It is a woodland species, with habits similar to the preceding, although it is usually found higher up in the trees than any of the lowland species.

## 287. *Trogon melanocephalus illætabilis* Bangs.

*Trogon melanocephalus* GOULD, Monogr. Trog., t. 12 (Tamaulipas, Mexico). — SALVIN, Ibis, 1870, 115 (Costa Rica [J. Carmiol]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 400 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (C. R.). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 462, *part* (Costa Rica [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 498, *part* (Costa Rica). — UNDERWOOD, Ibis, 1896, 444 (Miravalles and Bagáces). — BANGS, Auk, XXIV, 1907, 294 (Barránca [Underwood]).

*Trogon melanocephalus illætabilis* BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 30 (type from Bolson, Dec. 25, 1908 [C. F. Underwood]).

Bangs Collection : Bebedéro (Underwood).

Acad. Nat. Sci. Philadelphia : Miravalles (Underwood).

Carnegie Museum : Bagáces, Miravalles, Bebedéro (Carriker). Thirteen skins.

Mr. Bangs has recently separated the Costa Rican *T. melanocephalus* from the northern form on the color of the head and neck, which in the Mexican birds is pure black, while a large series of Costa Rican specimens shows it to be uniformly grayish to blackish slate-color.

This species is confined entirely to the Nicoya peninsula and southern Guanacáste, no specimens as yet having been taken on the mainland side of the Gulf of Nicoya. Costa Rica is the southernmost

limit for the species, it having come down the Pacific lowlands from Nicaragua, and into the Nicoya peninsula. It has been reported in eastern Nicaragua, but I have never seen it in northeastern Costa Rica; this, however, would be true *melanocephalus*, the new form being confined to the Pacific slope of Nicaragua as well as Costa Rica. In habits it is very like *T. atricollis*, inhabiting the forest, rather low down in the trees, and not being at all shy like *puella* or *underwoodi*.

288. **Trogon caligatus caligatus** Gould.

*Trogon caligatus* GOULD, Mon. Trog., t. 7; ed. 2, t. 16. — LAWRENCE, Ann. Lyc. N. Y., I X, 1868, 118 (San Mateo and Turrialba [Cooper], Birris and San Juan [Zeledón]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 400 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (Alajuela, Las Trojas, San José, Naránjo de Cartago, Birris de Cartago, Cartago, Jiménez). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 47 (Lagarto and Boruca). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 465 (Angostura [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 500 (C. R. references). — UNDERWOOD, Ibis, 1896, 444 (Miravalles). — BANGS, Auk, XXIV, 1907, 294 (Boruca, Barranca de Térraba and Barranca de Puntarenas [Underwood]).

*Trogon concinnus* LAWRENCE, Ann. Lyc. N. Y., I X, 1868, 119 (San Juan [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 312 (San Mateo, Guaitil, and San Juan de San José).

U. S. Nat. Museum: Bonilla and Guayábo (Ridgway and Zeledón) (Basulto).

Bangs Collection: Tenorio, Bolson, Juan Viñas (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirris, Juan Viñas, Guácimo, Miravalles, El Hogar, Bebedero, Esparta, Boruca, Rio Sicsola, and Buenos Aires de Térraba (Carriker). Twenty-seven skins.

Costa Rican birds compared with specimens from Guatemala and British Honduras are indistinguishable.

This is the most abundant and widely spread of all the trogons of Costa Rica, ranging over practically the whole of the country up to nearly 4,000 feet, but always more abundant at lower altitudes, that is, below 2,000 feet on the Caribbean slope and below 1,000 feet on the Pacific. It is found in the forest as well as in open woodlands and isolated clumps of trees, but is perhaps more partial to wooded pastures and other similar localities. It is usually quite tame and easily approached.

289. *Trogon massena* Gould.

*Trogon massena* GOULD, Mon. Trog., ed. 1, 1838, pl. 17. — CABANIS, Jour. für Orn., 1862, 174 (in the high mountain forests [Hoffmann]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 119 (Angostura [J. Carmiol], Tucurríqui [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 313 (C. R. — found only in the warm regions). — BOUCARD, P. Z. S., 1878, 48 (San Carlos). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 400 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (Pózo Azul de Pirrís, Jiménez, Naránjo de Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 47 (Lagarto and Boruca). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 1892, 474 (Valsa [Carmiol]). — RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 477 (Pacuare and Pózo Azul de Pirrís [Zeledón], Naránjo, Turrialba, Angostura, Jiménez [Cherrie], San Mateo [Cooper]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 503 (Mexico to Panama). — UNDERWOOD, Ibis, 1896, 444 (Miravalles). — BANGS, Auk, XXIV, 1907, 294 (Boruca and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Pigres (Zeledón), Bonilla (Ridgway).

Bangs Collection: La Vijagua, Pózo Azul de Pirrís, Carrillo (Underwood).

C. H. Lankester Collection: Banana River.

Carnegie Museum: Guápiles (Carriker & Crawford); Guácimo, El Hogar, La Honduras, Rio Sicsola, Cuábre, Guápiles, Boruca (Carriker); Pózo Azul de Pirrís (Underwood). Twenty-three skins.

Costa Rican and Panaman birds average a little smaller than birds from British Honduras and Mexico, but the difference is so small and there is such a range of variation that it is of little consequence.

*T. massena* is a very common bird in some parts of Costa Rica, inhabiting both the Caribbean and Pacific lowlands up to an altitude of about 2,000 feet, but is more abundant in the lowlands, between sea-level and 800 feet. It is strictly a bird of the forest, very rarely even going to the outskirts of the woodland. It keeps rather low down in the trees, unless feeding in a tall one, and is very tame and stupid as a rule.

290. *Trogon clathratus* Salvin.

*Trogon clathratus* SALVIN, P. Z. S., 1866, 75 (Sante Fé de Veraguas, Panama [Arcé]). — OGILVIE-GRANT, Cat. Birds Brit. Mus., XVII, 476 (Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 504 (Angostura [Carmiol]).

U. S. Nat. Museum: Bonilla (Ridgway).

Bangs Collection: La Vijagua, 2 ♂'s; Carrillo, 2 ♀'s (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Guápiles (Carriker & Crawford); Guápiles and Rio Sicsola (Carriker). Five skins.

The birds which Lawrence recorded as *T. clathratus* (Ann. Lyc. N. Y., IX, 1868, 119) and described as being the hitherto unknown female of that species, is certainly not that, but the female of *T. bairdi*, as has been noted in the *Biologia*, on the authority of Mr. Ogilvie-Grant. The record for this species given by Frantzius (Jour. für Orn., 1869, 313) is merely copied from Lawrence's Catalogue, hence means nothing, so that the first published record we have for its occurrence in Costa Rica is that given by Mr. Ogilvie-Grant in the Catalogue of the British Museum. It is a very rare bird, occurring only on the Caribbean slope between about 1,000 and 2,500 feet above sea-level. It inhabits the heavy forest and has habits similar to those of *T. massena*, so far as I was able to determine.

#### Family CUCULIDÆ.

##### 291. *Coccyzus ferrugineus* Gould.

*Coccyzus ferrugineus* GOULD, P. Z. S., 1843, 104; Zool. Voy. Sulph., Birds, I, 46. — TOWNSEND, Bull. Mus. Comp. Zool., XXVII, 1895, 123.

U. S. Nat. Museum: Cocos Island, two specimens (Townsend).

“But two specimens of this bird were obtained and not more than three or four others seen. As in the case of the Warbler (*Dendroica aureola* Gould) its relationships are with species inhabiting the West Indies, rather than with forms of the mainland.” (C. H. Townsend.)

##### 292. *Coccyzus minor minor* (Gmelin).

*Cuculus minor* GMELIN, Syst. Nat., I, 1788, 411 (Guiana).

*Coccyzus minor* GRAY, Gen. Birds, II, 457. — BOUCARD, P. Z. S., 1878, 47 (Puntarenas). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 536 (both coasts, and interior to 6,000 feet); Auk, IX, 1892, 327 (very rare about San José). — SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 304, Pl. 12, f. 2 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 523 (no C. R. specimens).

*Coccyzus seniculus* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 401 (La Palma de Nicoya).

*Coccyzus minor minor* BANGS, Auk, XXIV, 1907, 292 (El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Pígres (Ridgway and Zeledón).

C. H. Lankester Collection: Mojica.

Carnegie Museum: Bebedéro, five specimens (Carriker).

The first record we have for this cuckoo in Costa Rica is the speci-

men taken by Boucard at Puntarenas in 1877. Mr. Cherrie reports it to be found on both coasts and in the interior up to 6,000 feet, but I have never seen the bird on the Caribbean slope, nor do I know of any specimens which were taken there. In fact I believe it to be confined to the Pacific slope, rare on the higher portions and only to be found in comparative abundance on the western side of the Gulf of Nicoya.

293. *Coccyzus americanus americanus* (Linnæus).

*Cuculus americanus* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 111.

*Coccyzus americanus* BONAPARTE, Jour. Ac. Nat. Sci. Phila., III, ii, 1824, 367. — CABANIS, Jour. für Orn., 1862, 167 (C. R. [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (C. R. [Frantzius]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (San Juan de San José, Cartago). — CHERRIE, Auk, VII, 1890, 333; IX, 1892, 327 (San José, Sept. 10 to 28, three specimens). — SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 308 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 525, *part* (C. R. references).

Although the western form of the Yellow-billed Cuckoo has been taken in Costa Rica, I have placed all the published references to *C. americanus* under the eastern form, typical *americanus*, for the reason that it is almost always the eastern variety of any species that is taken in Costa Rica, when such a species is represented by two races in the United States. The birds of western North America do not (with a few exceptions) migrate so far south as the eastern ones, on account of the climate being warmer on that side, the birds finding suitable winter quarters much farther north than are found on the eastern side.

The cuckoos are not common winter visitors to Costa Rica, not a great many of them being seen or collected, so that it is not possible to determine just what portion of the country they inhabit during their sojourn there. However, I should suppose the present species, as well as the following one, to be confined more to the highland region than to the lowlands.

294. *Coccyzus americanus occidentalis* Ridgway.

*Coccyzus americanus occidentalis* RIDGWAY, Man. N. Am. Birds, 1887, 273. —

BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 24 (San José, Oct. 25, 1905 [Underwood]).

The first and only record that can be taken as authentic for the presence of this form in Costa Rica is the specimen collected by



Underwood at San José, Oct. 25, 1905, as recorded by Mr. Bangs (see above). It may be possible that there are other specimens of the western form collected in Costa Rica, but I have not seen or heard of them.

295. *Coccyzus erythrophthalmus* (Wilson)

*Cuculus erythrophthalmus* WILSON, Am. Orn., IV, 1811, 16, Pl. 28.

*Coccyzus erythrophthalmus* BONAPARTE, Jour. Ac. Nat. Sci. Phila., III, ii, 1824, 367. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (Barránca [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 361 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Barránca). — SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 311 (no C. R. specimens). — CHERRIE, Auk, IX, 1892, 327 (San José, Oct. 1). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 526 (no C. R. specimens).

This bird is evidently much rarer in Costa Rica during the winter than *C. americanus*, there being but very few records of its occurrence there. I did not meet with the bird, nor does Mr. Bangs have it in his collection from Costa Rica.

296. *Piaya cayana mehleri* (Bonaparte).

*Piaya cayana* SHELLEY, Cat. Birds Brit. Mus., XVII, 1891, 373 (Angostura [Carmiol], Bebedéro and Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 529 (C. R. references).

*Piaya mehleri* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (San José [J. Carmiol], Angostura [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 361 (San José). — BOUCARD, P. Z. S., 1878, 48 (San José).

*Pyrrhococcyx mehleri* CABANIS, Jour. für Orn., 1862, 167 (C. R. [Frantzius and Hoffmann]).

*Piaya cayana mehleri* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 401 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 498 (Irazú [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (San José, Alajuela, Liberia, Cartago, Jiménez). — CHERRIE, Auk, IX, 1892, 326 (San José, — abundant on both coasts up to 6,500 feet). — STONE, Proc. Acad. Nat. Sci. Phila., 1908, 499 (San José, Guayábo, Pígres, Volcan de Irazú, Bonilla, Santo Domingo de San Mateo, Talamanca).

*Piaya cayana thermophila* BANGS, Auk, XXIV, 1907, 292 (Boruca [Underwood]).

U. S. Nat. Museum: Pígres, Guayábo (Ridgway and Zeledón), Coliblanco, Bonilla, Santo Domingo de San Mateo (Ridgway), La Lagunaria de Dota (Basulto).

Carnegie Museum: Guápiles (Carriker & Crawford); Juan Viñas, Carrillo, Boruca (Carriker). Eight skins.

This is the commonest cuckoo in Costa Rica, except *Crotophaga sulcirostris*, being widely distributed and fairly abundant as to indi-

viduals in many localities. I think it is most abundant in the Caribbean lowlands, especially about newly cleared land, where there are piles of brush and rubbish and new second-growth scrub. It keeps low down in the trees, and has the habit of running along the branches like a squirrel, and it is very likely from this habit that the natives call it "Pajaro Ardilla" (squirrel bird), as has been suggested by Mr. Cherrie. Usually it is silent, but occasionally gives utterance to a loud harsh note, very difficult to describe.

Costa Rican specimens of *Piaya* are precisely alike from all parts of the country, both in size and coloration. They agree with birds from British Honduras in color, but are much smaller (wing about 18 mm. shorter).

267. ***Neomorphus salvini*** Sclater.

*Neomorphus salvini* SCLATER, P. Z. S., 1866, 60, pl. 5 (Santiago de Veraguas [Arcé]). — SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 417 (Nicaragua and Panama specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 533 (no C. R. records). — UNDERWOOD, Ibis, 1896, 445 (Miravalles, two specimens). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 30 (La Vijagua, Feb. 14, one; Cerro de Santa Maria, Jan. 9, 1908, one [Underwood]).

U. S. Nat. Museum: Bonilla (Zeledón).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

This is the rarest and least known of all the Central American cuckoos, not more than perhaps ten or a dozen of specimens having ever been taken in Costa Rica, the first record for it being the two birds taken at Miravalles by C. F. Underwood, and recorded by him (Ibis, 1896, 445). I never saw the bird but once, shooting one on the Sicsola River, Talamanca, which fell as though killed, but after hunting a long time I was not able to find it. It inhabits the thick forest, remaining on or near the ground, but alighting well up in a tree when flushed. Underwood says that the native name for the bird in Guanacaste is "Guia-leon" (Guide to the lion), so called because they firmly believe that these birds are always found near a Puma, or "Leon" as they call it.

298. ***Morococcyx erythropygus*** (Lesson).

*Coccyzus erythropyga* LESSON, Rev. Zool., 1842, 210.

*Morococcyx erythropygia* SCLATER, Cat. Am. Birds, 322. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (Pacaca [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 361 (Pacaca [Zeledón]). — BOUCARD, P. Z. S., 1878, 48 (Atenas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Liberia). — UNDERWOOD, Ibis, 1896, 444 (Miravalles to Bebedéro).

*Morococcyx erythropygus* SHELLEY, Cat. Birds Brit. Mus., XIX, 1892, 422 (Costa Rica [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 538 (Mexico to Costa Rica).

Bangs Collection : San José, Miravalles, Tenorio and Cerro de Santa Maria (Underwood).

Carnegie Museum : Miravalles, Esparta (Carriker). Three skins.

Northwestern Costa Rica is the southernmost limit of the range of this cuckoo, whence it extends northward into Mexico. In Costa Rica it has been found only on the Pacific slope from the Rio Grande de Tárcoles northward, and is most abundant in Guanacáste. I saw several birds in a rice-field at Nuestra Amo, west of San José, which acted quite like rails in their manner of flushing and quickly dropping back into the rice again, after which no amount of threshing around in the field would flush them again.

### 299. *Tapera nævia* (Linnæus).

*Cuculus nævius* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 170.

*Diplopterus nævius* BOIE, Isis, 1826, 977. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (Guaitíl [J. Carmiol], San Mateo [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 361 (San Mateo). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Pózo Azul de Pirrís, San Mateo). — CHERRIE, Auk, IX, 1892, 326 (San José, — a rare straggler). — SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 423 (San Mateo [Cooper], La Barránca [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 540 (Mexico to S. A.).

*Tapera* THUNBERG, 1819. (Authority Dr. C. W. Richmond.)

U. S. Nat. Museum : San Lucas, Alajuéla (Alfaro), Bebedéro (Underwood).

Bangs Collection : Bolson, Bebedéro, and Volcan de Póas (Underwood).

C. H. Lankester Collection : Turrúcares.

Confined to the Pacific slope and western side of the central plateau region, being taken in rare instances as high as 4,000 feet. It is commonest, however, around the shores of the Gulf of Nicoya, especially on the Nicoya side, but is nowhere an abundant bird. It is found almost entirely in scrubby woodland, keeping near the ground, as do the other members of the group found in this region.

The species covers a great range, and a thorough investigation as to the advisability of separating some of the distinctive forms is required. Such material is very hard to get together and has not been available for my use, therefore I have made no attempt to place the Costa Rican

form. Since the type is from Cayenne, it is very probable that Costa Rican birds are the same or nearly so, while it is quite possible that the Mexican birds are separable under the name of *excellens* Sclater.

300. *Dromococcyx phasianellus* (Spix).

*Macropus phasianellus* SPIX, Av. Bras., I, 1824, 53, Pl. 42.

*Dromococcyx phasianellus* WIED, [Beitr. [Naturg. Bras., IV, 1832, 353. — CABBANIS, Jour. für Orn., 1862, 171 (Costa Rica, one specimen [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 218 (Costa Rica [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 361 (C. R.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Santa Maria de Dota, two specimens). — SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 426 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 542 (Mexico to Brazil). — BANGS, Auk, XXIV, 1907, 292 (Boruca, one ♀ [Underwood]).

U. S. Nat. Museum: Santa Maria de Dota (Zeledón).

Bangs Collection: Bebedéro, ♂; Bolson, ♀ (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, ♀ juv.; Buenos Aires de Terraba, ♂ (Carriker).

The Pheasant Cuckoo, as it is sometimes called, is also a very rare bird, not only in Costa Rica, but throughout its extensive range, little or nothing being known concerning its habits. In Costa Rica, so far as is known, it inhabits only the lowlands of the Pacific coast, and has been taken at widely separated points, ranging from near Chiriquí almost to the Nicaraguan boundary. I have met with but two of these birds, but on both occasions was able to learn something concerning their curious habits. The first one was at Pózo Azul de Pirrís, an immature female, which had not yet left the nest, although fully fledged, and able to fly quite well. The birds had occupied an old nest of *Craspedoprion brevirostris*, which was suspended from a limb of a large tree, about twenty feet above the ground. (For description of nest see *Craspedoprion brevirostris*.) When I threw a stick against the limb above the nest the young bird flew out. I did not see either of the parent birds, although I searched the immediate vicinity, not only that day but several times later.

I secured another at Buenos Aires, an adult male, under rather peculiar circumstances. While walking along a road through some scrubby woodland near the river about noon, I was surprised to hear the most peculiar sounds imaginable, coming from the edge of the scrub just ahead and apparently on the ground. There were hoarse guttural chuckles and hissing noises of a most indescribable nature,

such as one would suspect to be given forth by some animal fighting. Slipping a heavy charge into the gun I crept softly toward the noise, expecting I knew not what, but certainly not what I finally saw. There on the ground, just inside the scrub, was a Pheasant Cuckoo, hopping up and down on the ground, with wings spread and head down, in a perfectly crazy manner, and all the while uttering the noises which had been so mystifying. I do not know what might have been the outcome, but I took no chance to allow the bird to escape, for *Dromococcyx phasianellus* is not to be picked up daily, and I speedily ended the performance.

301. *Crotophaga sulcirostris* Swainson.

*Crotophaga sulcirostris* SWAINSON, Phil. Mag., N. Ser., I, 1827, 440. — CABANIS, Jour. für Orn., 1862, 171 (Costa Rica [Frantzius, Hoffmann, and Ellendorf]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (San José [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 361 (Costa Rica). — BOUCARD, P. Z. S., 1878, 47 (San Carlos, common). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 401 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 498 (Irazú [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 122 (Alajuela, San José, and Cartago). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 48 (Boruca, — common on the outskirts of the villages); Auk, IX, 1892, 325 (San José, — one of the most abundant birds in Costa Rica from both coasts up to 7000 feet). — SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 432 (San José [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 545 (Texas to Peru). — UNDERWOOD, Ibis, 1896, 444 (Miravalles, — all parts of the country).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón).

C. H. Lankester Collection: Las Concovas (a partial albino).

Carnegie Museum: Tierra Blanca (Carriker). Two skins.

A very abundant bird in all parts of the country where any clearings have been made and stock has been introduced. They never go into the woodland, but as soon as forest has been felled they appear at once, evidently to feed on the many insects to be found in the soft second-growth which springs up so quickly in the tropics. They are always to be seen in considerable numbers about pastures, perched in long rows on wire fences or limbs of trees, often so close to each other that their bodies touch. They have a low chuckling, not unmusical note, and are very tame. Ticks are a great scourge to cattle everywhere in the tropics and this bird is always to be found with stock, feeding on the ticks. They walk over the backs of the animals and pull off the ticks or fly up from the ground and pick them off their legs.

They are very fond of building their nests in the trees of citrus-fruits, especially bitter orange seedlings. The nest is a huge, bulky affair, made entirely of twigs, usually with thorns on them, and lined inside with a quantity of green leaves, usually orange leaves. There are always a large number of eggs in a nest and as there are never many nests in one locality, it is quite obvious that several females lay in the same nest, taking turns at incubating. The number of eggs in each nest ranges from six to twelve. They are elliptical, blue in color, but always overlaid with a white chalky substance, easily scratched off, which is always more or less scraped and obliterated by the claws of the birds in turning the eggs. Eggs measure:  $33$  to  $36.5 \times 24$  to  $27$  mm.

Family CAPITONIDÆ.

302. *Capito bourcieri salvini* (Shelley).

*Capito bourcieri* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 130 (Barránca [J. Carmiol], Turrialba [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 363 (Costa Rica). — BOUCARD, P. Z. S., 1878, 47 (Orósi and Navárrro). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Naránjo de Cartago, Birris de Cartago, Jiménez). — CHERRIE, Expl. Zool. en C. R., 1890-1, 49 (Térraba, rare).

*Capito hartlaubi* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 130 (Barránca [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 363 (Costa Rica).

*Capito salvini* SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 119 (Barránca [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 549 (Costa Rica and Panama).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Los Reyes and La Lagunaria de Dota (Basulto), La Estrella de Cartago and Jiménez (Castro).

Bangs Collection: Azahár de Cartago, Cariblanco de Sarapiquí, Carrillo (Underwood).

Carnegie Museum: Carrillo, four specimens (Carriker), Tobósi (Francisco Ulloa Cooper). Five skins.

The Costa Rican bird, known as *C. salvini* Shelley, is certainly only a subspecies of the South American *C. bourcieri* (Lafr.). The males are indistinguishable, the sole difference between the two forms being the presence or absence of the blue-green frontal band in the female, while birds taken in northern Colombia show indications of this band, being more or less intermediate between the two extreme forms.

*C. b. salvini* is widely distributed over Costa Rica, covering the highlands and both slopes down to about 1,000 feet above sea-level. It is found in the forest, usually rather high up in the trees, and is quite solitary in its habits.

**DICRORHYNCHUS** \* genus nov. (*Capitonidæ*.)

Related to *Semnornis* Richmond, but differing in having the maxilla much less swollen basally, and of the same color as the remainder of the bill; with the maxillary ridge narrower and sharper and with the nasal slit less pronounced; with the color pattern of the whole body very different, having none of the vivid and contrasted colors of *Semnornis*, but plainly and uniformly colored both above and below.

Type. — *Tetragonops frantzii* Sclater.

303. **Dicrorhynchus frantzii** (Sclater).

*Tetragonops frantzii* SCLATER, Ibis, 1864, 371, 10 (Costa Rica [Frantzius]). — FRANTZIUS, Ibis, 1865, 551 (Birrís, Costa Rica); Jour. für Orn., 1869, 363 (Quebrada Honda, La Palma, Cervántes). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 130 (San José [Frantzius], Cervántes [J. Carmiol]. Navárrro [Cooper], Birrís and La Palma [Zeledón]). — BOUCARD, P. Z. S., 1878, 47 (Navárrro). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Cervántes). — SHELLEY, Cat. Birds Brit. Mus., XIX, 1891, 121 (Irazú district [Rogers], Navárrro [Cooper]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 550 (Costa Rican references).

*Semnornis* RICHMOND, Auk, XVII, 1900, 179 (new name for *Pan* Richmond [vice *Tetragonops* Jardine] preoccupied; type *Tetragonops rhamphastinus*).

U. S. Nat. Museum: Burgos de Irazú, Carrillo, La Estrella de Cartago (Castro); Coliblanco (Ridgway).

Bangs Collection: Azahár de Cartago, Volcan de Irazú (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: La Hondura (Carriker). Nine skins.

This peculiar species is distributed over the higher parts of the Caribbean slope and along the eastern edge of the plateau region, from about 1,200 feet up to perhaps 6,000 feet. They are most abundant between 2,000 and 4,000 feet, usually move in small bands, though often alone, and has a very peculiar call, resembling that of a gallinaceous bird. It inhabits the heavy forest, and seems partial to the borders of creeks, where it is almost always found rather low down in the trees.

## Family RHAMPHASTIDÆ.

## KEY TO THE COSTA RICAN SPECIES.

a. Throat yellowish; breast and abdomen black; under tail-coverts red.

b. Bill larger (adult, 150 to 180 mm.); apical half of maxilla and basal portion above bright yellow; sides of maxilla at base and basal portion of mandible blood-red.

*Rhamphastos tocand* ♂, ♀.

\* (*δίκροος*, bifurcate; *ῥόγχος*, bill).

- bb.* Bill shorter (115 to 140 mm.); apical portion of maxilla and mandible deep purplish blood-red. *Rhamphastos brevicarinatus* ♂, ♀.
- aa.* Throat black or deep cerulean-blue.
- b.* Throat black; breast and abdomen reddish-yellow, with red or black bands, or else almost entirely black below.
- c.* Almost entirely black below; back and wings green; flanks yellow; thighs chestnut.
- d.* Crown black; auricular region lemon-yellow. *Selenidera spectabilis* ♂.
- dd.* Crown burnt-umber-brown; auriculars black. *Selenidera spectabilis* ♀.
- cc.* Only throat black below; whole head black; a brown band across nape; back dark bluish green; upper tail-coverts red and lower parts mainly reddish-yellow; thighs dark chestnut-brown.
- d.* A narrow black band across upper part of abdomen (sometimes mixed with red (10 to 18 mm. wide). *Pteroglossus torquatus*, ♂, ♀.
- dd.* A black blotch in centre of reddish-yellow breast and a wide crimson band across abdomen (sometimes mixed with black). *Pteroglossus frantzii*, ♂, ♀.
- bb.* Throat blue; dark grass-green above, yellowish grass-green below; vent and under tail-coverts chestnut. *Aulacorhamphus cæruleigularis*, ♂, ♀.

### 304. *Rhamphastos brevicarinatus* Gould.

- Rhamphastos brevicarinatus* GOULD, Monogr. Rhamph., ed. 2, 1854, pl. 3. — CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 103 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 126 (Turrialba [Arcé], C. R. [Carmioli and Frantzii]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 553 (Nicaragua and Panama).
- Rhamphastos approximans* CABANIS, Jour. für Orn., 1862, 333 (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128, 129 (San José [Frantzii], Angostura, Dota, and Grecia [J. Carmioli]). — FRANTZII, Jour. für Orn., 1869, 362 (Grecia, Angostura, Dota Mts., Candelaria Mts., Aguacate Mts., Machuca, Orósi, Tucurríqui).
- Rhamphastos carinatus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Cartago, Naránjo de Cartago, Turrialba). — UNDERWOOD, Ibis, 1896, 445 (Miravalles).
- U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway and Alfaro) (Basulto).
- Bangs Collection: Tenorio, Juan Viñas (Underwood).
- Fleming Collection: Miravalles and La Gloria (Underwood).
- C. H. Lankester Collection: Miravalles, Guácimo, Cariblanco de Sarapiquí.
- Carnegie Museum: Guaitil, Guácimo, Cuábre, El Hogar, Miravalles, Juan Viñas (Carriker). Eight skins.



It is a question whether *R. brevicarinatus* should, or should not, be considered a subspecies of *R. carinatus* of northern Central America. The differences between the two birds are not great, but are very constant, and I have not seen any birds which could be called intermediates between the two. For this reason I have left it as given by other authors, but future investigation may prove it a subspecies of *carinatus*.

The Costa Rican range of this species covers the whole of the highland portion of the country up to perhaps 4,000 feet, and down on both slopes to near sea-level. In the lower altitudes it is found in company with *R. tocard*, but in smaller numbers. I believe it to be more abundant on the higher portions of the Caribbean slope than on the Pacific slope at any point. It inhabits only the heavy forest, seldom, if ever, going out into the open and sparsely wooded district, as do some of the other species of the family in Costa Rica. Their notes and habits are about the same as those of *R. tocard*, except that they seem more solitary, not gathering into flocks so much as does *R. tocard*.

### 305. *Rhamphastos tocard* Vieillot.

*Rhamphastos tocard* VIEILLOT, N. Dict. d'Hist. Nat., XXIV, 231. — CABANIS, Jour. für Orn., 1862, 334 (C. R. [Frantzius]). — CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 103 (Angostura, San Carlos, Turrialba [J. Carmiol]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 128 (Angostura, San Carlos and Turrialba [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 362 (Tucurríqui, San Carlos, Angostura). — BOUCARD, P. Z. S., 1878, 46 (San Carlos, common). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Naránjo de Cartago, Jiménez, Las Trojas, Pózo Azul de Pirrís). — SCLATER, Cat. Birds Brit. Mus., XI X, 1891, 127 (Angostura [Carmiol] San José [M. Calleja]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 554 (Nicaragua to Peru). — BANGS, Auk, XXIV, 1907, 293 (Boruca, Paso Real and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Guayábo and Bonilla (Ridgway and Zeledón), Bonilla (Basulto).

Bangs Collection: Reventazón, Pózo Azul de Pirrís (Underwood).

C. H. Lankester Collection: Sarapiquí.

Carnegie Museum: Pózo Azul de Pirrís and El Pózo de Térraba (Carriker); Guápiles (Carriker & Crawford); Pózo Azul de Pirrís (Underwood). Seven skins.

This is the most abundant toucan of Costa Rica, inhabiting the lowlands, ranging over the whole of the Caribbean and Pacific slopes,

up to 3,000 feet (rarely above 1,500) on the Caribbean side and about 800 feet on the Pacific. They seldom leave the heavy forests, and are usually seen in the tops of the highest trees, unless they are accidentally encountered feeding in a low one. They have the habit of perching on a lofty dead or exposed limb, where they may remain perfectly quiet for some time. Their note is rather pleasing, but has a melancholy tone, especially when heard in the evening just about dusk, at which time they always call. The note also has a marked ventriloquistic quality, rendering it very difficult to locate a bird which is heard calling, for one moment it seems to be high up in a tree, and the next down on the ground. Fruits of various kinds form their entire source of food.

306. *Pteroglossus torquatus* (Gmelin).

*Rhamphastus torquatus* GMELIN, Syst. Nat., I, 1788, 354.

*Pteroglossus torquatus* WAGLER, Isis, 1829, 508. — CABANIS, Jour. für Orn., 1862, 331 (San Miguel and Sarapiquí [Frantzius]). — CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 110 (Angostura and Turrialba [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 129 (Angostura and Turrialba [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 316 (Angostura and Turrialba). — BOUCARD, P. Z. S., 1878, 46 (San Carlos, common). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 401 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Naránjo de Cartago, Jiménez, and Liberia). — SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 141 (Bebedéro [Arcé]). — UNDERWOOD, Ibis, 1896, 445 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896 (Mexico to Venezuela).

U. S. Nat. Museum: Guayábo and Bonilla (Ridgway and Zeledón).  
Bangs Collection: Bolson, Tenorio, Jiménez (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Guácimo, Carrillo, El Hogar, Miravalles (Carriker). Ten skins.

Two skins of this species from Santa Marta, Colombia, have the black spot on the chest very pronounced (as in *Pteroglossus frantzii*) while in Costa Rican birds it is only present as a very small spot in two skins out of ten. Birds from British Honduras resemble those from Costa Rica, but two skins out of four examined having a small spot, while all have the chest very red, much more so than any of the Costa Rican or Colombian birds.

This species is present over the whole of the Caribbean lowlands, up to about 3,000 feet, and on the Pacific side only from the Gulf of Nicoya northward. On the Pacific slope it does not go much above 1,500 feet, and is rare above 1,000 feet. It frequents open wood-

land and scattering trees in pastures, as well as the heavy forest, and is almost always seen in small flocks. It is not a shy bird by any means, permitting itself to be closely approached, and the entire flock will often remain in a tree after one of its members has been shot. The note is very peculiar, not unmusical, but with an odd grating or rasping sound. Nutting states that he shot one with a large beetle in its mouth, but I have never found anything but fruit and berries in the crop. It is supposed to breed in holes in trees, but I have never seen the nest.

307. **Pteroglossus frantzii** Cabanis.

*Pteroglossus frantzii* CABANIS, Sitz. Ber. Ges. Naturf. Freunde z. Berlin, 1861; Jour. für Orn., 1862, 333 (Aguacate Mts. [Frantzii]). — CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 111 (San José and Angostura). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 129 (San José and Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 362 (San Mateo). — BOUCARD, P. Z. S., 1878, 47 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Pózo Azul de Pirrís, Las Trojas, Monte Redondo). — SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 142 (San José [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 557 (Costa Rica and Chiriquí). — BANGS, Auk, XXIV, 1907, 293 (Boruca and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Pígres (Ridgway), Santo Domingo de San Mateo (Alfaro).

Bangs Collection: Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, Boruca, and El Pózo de Térraba (Carriker). Four skins.

This species has been recorded by early writers and collectors from San José, Angostura, and San Carlos, the two latter localities on the Caribbean slope at a rather low altitude. I have never taken it or seen a specimen taken on the Caribbean slope, and I feel quite sure that early writers must have confused the two birds, or else they were not labelled properly by the collectors.

From my own experience and from the published records for the species, I am inclined to restrict its range exclusively to the Pacific slope and from the Gulf of Nicoya southward. It very probably does get up on the plateau region in small numbers, but the region where it is most commonly found is between sea-level and 1,500 feet. Its habits are precisely the same as those of the preceding species.

308. **Selenidera spectabilis** Cassin.

*Selenidera spectabilis* CASSIN, Proc. Acad. Nat. Sci. Phila., 1857, 214 (Cocuyos de Veragua); 1867, 118 (Costa Rica [Carmiol]). — LAWRENCE, Ann. Lyc.

N. Y., IX, 1868, 129 (C. R. [Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 362 (Tucurríqui). — BOUCARD, P. Z. S., 1878, 47 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Rio Súcio). — SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 153 (Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 558 (Nicaragua to Panama).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway, Zeledón and Alfaro) (Basulto).

Bangs Collection: Tenorio, Juan Viñas, and Aguacate Mts. (Underwood).

C. H. Lankester Collection: Juan Viñas.

Carnegie Museum: Juan Viñas (Lankester). One skin.

This is a very rare toucan in Costa Rica, and until recently very few specimens were in existence from that country. During his two trips to Costa Rica (1905 and 1908) Mr. Ridgway secured eleven skins from Guayábo and Bonilla. It had been taken by several collectors at Juan Viñas, but I was unable to find it there, although I spent over two months in the vicinity.

It seems to be confined almost entirely to the Caribbean slope between the altitudes of about 1,500 to 3,500 feet. The only specimen I know of that was taken elsewhere was one from the Aguacate Mountains by Underwood. It is a bird of the forest, and with habits more like those of *Rhamphastos* than *Pteroglossus*.

### 309. *Aulacorhamphus cæruleigularis* Gould.

*Aulacorhamphus cæruleigularis* GOULD, P. Z. S., 1853, 45 (Veragua). — CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 121 (Birris, La Palma and Dota Mts. [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 129 (Barránca, Dota, and Tuirialba [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 362 (Costa Rica). — BOUCARD, P. Z. S., 1878, 47 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Naránjo de Cartago, Cartago, Volcan de Irazú, Monte Redondo, Navarro de Cartago). — SCLATER, Cat. Birds Brit. Mus., XIX, 159 (1891), San José [Zeledón], Costa Rica [Rogers and Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 561 (Costa Rica and Veragua).

*Aulacorhynchus cæruleigularis* CABANIS, Jour. für Orn., 1862, 331 (Volcan de Barba [Hoffmann]).

U. S. Nat. Museum: Guayábo and Monte Redondo (Ridgway and Zeledón), El Copéy and Santa Maria de Dota (Basulto), Coliblanco (Ridgway).

Bangs Collection: Cerro de Santa Maria, Estrella de Cartago, Escazú, Volcan de Irazú (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Juan Viñas, La Hondura (Carriker); Tobósi (Francisco Cooper Ulloa). Thirteen skins.

This handsome little toucan, the smallest in Costa Rica, is confined to the higher portions of the country, ranging over the whole of the plateau region down to about 2,500 feet on the Caribbean slope and perhaps a little lower on the Pacific, and up to at least 6,000 feet in the mountains. It is found in the heavy forest as well as in the open woodland, scattered trees, and roadside scrub. They are usually seen in small flocks of from four to eight, are quite tame, and, like all the toucans, very stupid.

They breed in holes in trees, usually abandoned nests of *Campephilus guatemalensis buxans* or even of *Chloronerpes yucatanensis*. I have not seen the eggs, but nests examined at Juan Viñas in May each contained two young.

#### Family GALBULIDÆ.

##### 310. *Galbula melanogenia* Sclater.

*Galbula melanogenia* SCLATER, Contr. Orn., 1852, 61, pl. 90. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118 (Pacuare and San Carlos [J. Carmiol], Turrialba [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 311 (Pacuare, Turrialba and San Carlos). — BOUCARD, P. Z. S., 1878, 47 (San Carlos). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 400 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Jiménez, Las Trojas, San Mateo, Pózo Azul de Pirrís, and Pacuare). — CHERRIE, Expl. Zool. en C. R., 1890-I, 48 (Palmar, Boruca, Lagarto, and Buenos Aires). — SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 166 (Bebedéro [Arcé], Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, II, 1896, 506 (Bebedéro [Underwood], Mexico to western Ecuador). — BANGS, Auk, XXIV, 1907, 293 (Boruca, Paso Real and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Bonilla (Ridgway) (Basulto).

Bangs Collection: El General, Pózo Azul de Pirrís, Bolson and Carrillo (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Guápiles (Carriker & Crawford); Guácimo, Pózo Azul de Pirrís, Juan Viñas, Carrillo, El Hogar, El Pózo de Térraba, Buenos Aires (Carriker). Seventeen skins.

This beautiful little jacamar is found in all portions of Costa Rica below 2,000 feet, occasionally getting up to 3,000 feet on the Caribbean slope, but not usually seen above 1,500 feet on the Pacific slope. It frequents the heavy forest almost exclusively, although often seen

along the edges of clearings, or in bits of thick jungle where there are no large trees. It is also often seen along the banks of small creeks in the forest. It has a rather weak call, rather pleasant to the ear, which it utters while perched on a branch, accompanying it with a violent jerking of the tail and upward tilt of the bill. It is always seen in pairs.

310. *Jacamerops aurea* (P. L. S. Müller).

*Alcedo aurea* MULLER, Natursyst. Suppl., 1776, 94.

*Jacamerops grandis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Jiménez).

— SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 176 (no C. R. specimens).

*Jacamerops aurea* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 508 (Costa Rica to Peru and Guiana).

Bangs Collection: Carrillo, ♂ and ♀ (Underwood).

C. H. Lankester Collection: El Hogar, ♂ and ♀.

Carnegie Museum: Rio Sicsola, ♂; El Hogar, ♀ (Carriker).

A very rare bird in Costa Rica, of which there are probably not more than eight or ten specimens in existence, taken in Costa Rica. Its habits are quite similar to those of *Galbula melanogenia*, with the exception that this bird keeps entirely in the heavy forest, usually in low damp places. I saw but the one male secured, during a residence of nearly a year in the Talamanca district. At El Hogar it is evidently more numerous, for there Mr. Lankester secured a male and two females, one of which he gave me. On one occasion I saw there a pair in the forest when I was without a gun, but could not find them when I returned the following day to the same place. They are very tame, or rather stupid, not seeming to know what fear is, for I repeatedly approached very near, throwing sticks in a vain endeavor to knock them down, and even when flushed in this manner they only flew a short distance and permitted me to repeat the performance.

Family BUCCONIDÆ.

312. *Bucco dysoni* Sclater.

*Bucco dysoni* SCLATER, P. Z. S., 1855, 193 (Honduras). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 401 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (Pacuare and Pózo Azul de Pirrís). — SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 182 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 511 (Mexico to Upper Amazons, — no C. R. specimens). — BANGS, Auk, XXIV, 1907, 293 (Paso Real de Térraba, ♂ and ♀ [Underwood]).

U. S. Nat. Museum : Pígres (Zeledón).

C. H. Lankester Collection : El Hogar.

Carnegie Museum : Guácimo, three specimens ; El Hogar, four specimens (Carriker).

This bucco is very rare not only in Costa Rica, but throughout its entire range, which extends from southern Mexico down to Ecuador and the Upper Amazons. It was first taken in Costa Rica by Nutting at La Palma de Nicoya. The next record is by Zeledón from Pacuare and Pózo Azul de Pirrís, one specimen from each locality. There are no other published records for the species from Costa Rica, except the pair taken by Underwood at Paso Real, as recorded by Mr Bangs.

I found the bird fairly common at Guácimo and El Hogar, but under peculiar circumstances, such as would not often be met with by collectors. There had been a large area of forest felled within a short time for the planting of bananas, and within two or three months after the falling of the trees, these birds began to appear, evidently congregating from the surrounding forest to feed on the numerous wood-boring beetles in the half decayed trees. They are very tame, allowing one to approach within a few feet before flying.

### 313. *Malacoptila panamensis* Lafresnaye.

*Malacoptila panamensis* LAFRESNAYE, Rev. Zool., 1847, 79 (Panama [Delattre]).

— ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119, *part* (Las Trojas, Pózo Azul de Pirrís). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 48 (Palmar, Lagarto, and Boruca). — UNDERWOOD, Ibis, 1896, 444 (Miravalles). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 516, *part* (Costa Rican references and localities).

*Malacoptila costaricensis* CABANIS, Jour. für Orn., 1862, 172, *part* (Costa Rica [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118 (San Mateo [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 312, *part* (San Mateo and Guaitil).

*Malacoptila inornata* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118, *part* (Dota [F. Carmiol]).

*Malacoptila veræ-pacis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118, *part* (Guaitil [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 311, *part* (Costa Rica).

*Malacoptila panamensis* var. *costaricensis* SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 196, *part* (Dota [Carmiol]).

*Malacoptila panamensis panamensis* BANGS, Auk, XXIV, 1907, 293 (Boruca, Paso Real, El Pózo, and Lagarto de Térraba [Underwood]).

U. S. Nat. Museum : Santo Domingo (Alfaro), Pózo Azul de Pirrís (Zeledón).

Bangs Collection : El General de Térraba (Underwood).

C. H. Lankester Collection : Abangares.

Carnegie Museum : Pózo Azul de Pirris, El Pózo de Térraba, Boruca, Miravalles (Carriker). Eight skins.

The Panaman *Malacoptila* is found only on the Pacific slope and lowlands of Costa Rica, where it is found in large numbers in the southern part, gradually diminishing northward, until in Guanacaste (northern part) it is not so abundant. They are found from sea-level up to nearly, if not quite, 3,000 feet, but are most abundant below 1,000 feet. The birds occur only in the forest, preferring the thick jungle, where there are many vines and much tangled undergrowth. They seldom perch higher than twenty-five feet above the earth, usually much lower, and are the most stupid birds imaginable, permitting a person to approach to within a few feet of them before flying.

### 314. *Malacoptila inornata* (Du Bus).

*Monasa inornata* DU BUS, Bull. Ac. Brux., XIV, pt. 2, 1847, p. 107.

*Malacoptila inornata* SCLATER, Ann. and Mag. N. H., XIII, 1854, 478; Cat. Birds Brit. Mus., XIX, 1891, 197 (Guatemala). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118, *part* (Angostura [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 312, *part* (Pacuare and Angostura). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 517 (Costa Rica not included in its range; Greytown, Nicaragua, southernmost record).

*Malacoptila panamensis* (not of Lafresnaye) BOUCARD, P. Z. S., 1878, 47 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119, *part* (Jiménez and Angostura). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 516, *part* (Costa Rican references).

*Malacoptila veræ-pacis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118 *part* (Pacuare [J. Carmiol]).

*Malacoptila costaricensis* CABANIS, Jour. für Orn., 1862, 172, *part* (Costa Rica). — FRANTZIUS, Jour. für Orn., 1869, 312, *part* (Angostura and Pacuare).

*Malacoptila panamensis* var. *costaricensis* SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 196, *part* (Tucurríqui [Arcé], Péje [Carmiol]).

U. S. Nat. Museum : Guayábo (Ridgway and Zeledón).

Bangs Collection : Carrillo and La Vijagua (Underwood).

Fleming Collection : Reventazón (Underwood).

C. H. Lankester Collection : La Crestina (= Jiménez).

Carnegie Museum : Guápiles (Carriker & Crawford), Rio Sicsola, El Hogar, Guácimo, Carrillo, Cuábre (Carriker). Fifteen skins.

All specimens of *Malacoptila* which I have examined from the Caribbean slope of Costa Rica prove to be *M. inornata* and not *pana-*



*ensis*, as given by almost all authors on Costa Rican birds. Lawrence recorded the species from Costa Rica in 1868, but had the range confused, as well as confusing several supposed species with it. The southern range of the bird in all probability ends in northeastern Chiriquí, but it is an abundant species over the whole of the Caribbean lowlands, from the San Juan River to the Sicsola. Its habits are the same as those of *M. panamensis*.

### 315. *Monasa grandior* Sclater and Salvin.

*Monasa peruana* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 118 (San Carlos and Pacuare [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 312 (San Carlos and Pacuare).

*Monasa grandior* SCLATER & SALVIN, P. Z. S., 1868, 327 (Angostura [Carmioli]). — SALVIN, Ibis, 1869, 315 (crit.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 120 (Rio Súcio and Jiménez). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1896, 520 (Nicaragua and Costa Rica).

*Monacha grandior* SCLATER, Cat. Birds Brit. Mus., XIX, 1891, 205 (Angostura and San Carlos [Carmioli]).

Bangs Collection: Jiménez and La Vijagua (Underwood).

C. H. Lankester Collection: Banana River.

Carnegie Museum: Guácimo (Carriker & Crawford); Cuábres, Guápiles, El Hogar (Carriker). Twelve skins.

This singular bird, easily recognized by the bright salmon-red bill, is found only on the Caribbean slope of Nicaragua, Costa Rica, and northern Chiriquí. I have taken it in Costa Rica at numerous points along the eastern lowlands, but never above 1,200 feet, although it does go up some of the larger river-valleys a little higher, as at Angostura (about 1,800 feet) whence came the type. It is found only in the forest, but does not seek out the dark secluded spots, as does *Jacamerops*, but prefers the edges of clearings, or little open spots in the forest caused by the falling of a large tree. It is always seen in pairs, and is very tame and easily approached. It has a note rather similar to *Galbula melanogenia*, and also jerks its tail when calling.

### Family PICIDÆ.

#### KEY TO THE COSTA RICAN SPECIES.

- a. Size large (wing not less than 175 mm.); breast and abdomen barred with black and buff; an elongated scarlet crest; chest black.
- b. A buff-ochraceous stripe from nostril to shoulder.
- c. Bill pale horn or ivory-white; inner wing-coverts distinctly yellowish.
- d. Forehead and malar region scarlet.

*Ceophlæus lineatus scapularis*, ♂.

- dd. Forehead and malar region black.  
*Ceophlæus lineatus scapularis*, ♀.
- cc. Bill black; inner wing-coverts nearly white, only slightly yellowish.  
 d. Forehead and malar region scarlet.  
*Ceophlæus lineatus lineatus*, ♂.
- dd. Forehead and malar region black.  
*Ceophlæus lineatus lineatus*, ♀.
- bb. No buff-ochraceous streak on side of head (begins at end of scarlet).  
 c. Whole head and throat scarlet. *Campephilus guatemalensis buxans*, ♂.
- cc. Forehead and throat black. *Campephilus guatemalensis buxans*, ♀.
- aa. Size smaller (wing not more than 135 mm.); no elongated scarlet crest.  
 b. Back and wings not barred or spotted, uniform black, greenish, or golden-brown.  
 c. Back and wings black; forehead and rump white; throat yellow.  
 d. Whole crown and nape crimson.  
*Melanerpes formicivorus striatipectus*, ♂.
- dd. Whole of crown black. *Melanerpes formicivorus striatipectus*, ♀.
- cc. Back and wings green, golden-green or golden-brown.  
 d. Size very small (wing 52 mm.); whole crown and nape brownish-black, nape dotted with white.  
 e. Forehead spotted with reddish-yellow.  
*Picumnus olivaceus flavotinctus*, ♂.
- ee. Forehead unspotted. *Picumnus olivaceus flavotinctus*, ♀.
- dd. Size medium or larger.  
 e. Underparts barred.  
 f. Rump scarlet; back golden-brown; underparts dusky grayish-brown, finely barred with white.  
 g. Crown and nape feathers tipped with crimson.  
*Veniliornis neglectus*, ♂.
- gg. Crown and nape sooty-black.  
*Veniliornis neglectus*, ♀.
- ff. Rump nearly or quite concolorous with back.  
 g. Remiges barred with cinnamon-rufous; throat and chest dark olive-green; breast and abdomen greenish-buffy, barred with dark green.  
 h. Crown and malar region crimson.  
*Chloronerpes simplex*, ♂.
- hh. Crown dull green, only nuchal collar crimson.  
*Chloronerpes simplex*, ♀.
- gg. Remiges not barred.  
 h. Crown blackish-slate; entire under parts barred; back golden-olive.  
 i. Only nape crimson.  
*Chloronerpes yucatanensis*, ♀.
- ii. Sides of nape and malar region also crimson.  
*Chloronerpes yucatanensis*, ♂.

- hh.* Crown brownish-black or tipped with crimson;  
back and lower parts uniform golden-  
brown.
- i.* Crown feathers tipped with crimson.  
*Veniliornis caboti*, ♂.
- ii.* Crown dull blackish-brown.  
*Veniliornis caboti*, ♀.
- bb.* Back and wings barred with black, or white, or else black with a white  
median stripe.
- c.* Back and wings mostly black, with a whitish streak down centre of  
back.
- d.* Lower parts mainly brownish-buff.
- e.* Middle of crown and nape scarlet.  
*Dryobates villosus extimus*, ♂.
- ee.* Entire crown and nape black.  
*Dryobates villosus extimus*, ♀.
- dd.* Under parts mainly golden-olive; middle of belly scarlet; flanks  
barred with black; forehead and nape orange.
- e.* Crown scarlet.  
*Melanerpes chrysauhen*, ♂.
- ee.* Crown black.  
*Melanerpes chrysauhen*, ♀.
- cc.* Back and wings barred with white, or with black.
- d.* Upper parts cinnamon or chestnut-brown.
- e.* Bill pale ivory; elongated nuchal crest, together with crown,  
buff-ochraceous; lower parts deep chestnut, barred  
with black.
- f.* Malar region crimson.  
*Celeus castaneus*, ♂.
- ff.* Malar region concolorous with head.  
*Celeus castaneus*, ♀.
- ee.* Bill blackish above, olive-white below; crest and crown con-  
colorous with back; lower parts cinnamon-buff, with  
black markings.
- f.* Throat crimson.  
*Celeus loricatus*, ♂.
- ff.* Throat brown.  
*Celeus loricatus*, ♀.
- dd.* Upper parts black, barred with white.
- e.* Centre of abdomen scarlet.
- f.* Flanks heavily barred with black; forehead deep orange;  
white bars on back very narrow.
- g.* Whole crown and nape crimson.  
*Melanerpes pucherani*, ♂.
- gg.* Only nape crimson, crown black.  
*Melanerpes pucherani*, ♀.
- ff.* Flanks scarcely barred; white bars of back and wings  
wider.
- g.* Crown and nape crimson.  
*Melanerpes wagleri wagleri*, ♂.
- gg.* Crown and nape dirty buff-white.  
*Melanerpes wagleri wagleri*, ♀.

ee. Centre of abdomen orange-yellow; forehead and nape orange, front paler.

f. Centre of crown scarlet. *Melanerpes hoffmanni*, ♂.

ff. Centre of crown dirty buff. *Melanerpes hoffmanni*, ♀.

### 316. *Chloronerpes simplex simplex* SALVIN.

*Chloronerpes simplex* SALVIN, P. Z. S., 1870, 212 (Bugába, Panama [Arcé]). — HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 81 (Chiriquí). — SALVIN, Ibis, 1874, 317 (Talamanca [Gabb]). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 536 (Pózo Azul de Pirrís, also Atlantic side). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 410 (Nicaragua to Panama).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway), Pózo Azul de Pirrís (Zeledón).

Bangs Collection: Pózo Azul de Pirrís and La Vijagua (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Rio Sicsola, Carrillo, El Hogar and El Pózo de Térraba (Carriker). Four skins.

A very rare woodpecker in Costa Rica. I have taken four specimens in very widely separated places, but have never seen more than one bird in any one locality. It is confined entirely to the lowlands, not going above 2,000 feet, and keeps within the heavy forest. All the birds which I saw were quite low down, but I cannot say whether this is a characteristic habit.

### 317. *Chloronerpes yucatanensis uropygialis* (Cabanis).

*Picus yucatanensis* CABOT, Jour. Boston Soc. Nat. Hist., 1845, 92 (Yucatan).

*Chloronerpes yucatanensis* MOORE, P. Z. S., 1859, 60. — LAWRENCE, Ann. Lyc.

N. Y., IX, 1868, 131 (Turrialba [Cooper], Barránca [J. Carmiol]). — FRANT-

ZIUS, Jour. für Orn., 1869, 364 (Tres Ríos). — ZELEDÓN, An. Mus. Nac. de

C. R., I, 1887, 124 (Naránjo de Cartago, Rio Súcio, Sarchí de Alajuela). —

HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 84 (Costa Rica [Carmiol]).

— RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 518 (San Carlos). — SALVIN

and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 407 (Mexico to W. Ecuador),

*Chloronerpes uropygialis* CABANIS, Jour. für Orn., 1862, 321 (Candelaria Mts. [Hoffmann]).

*Chloronerpes yucatanensis uropygialis*, BANGS, Proc. Biol. Soc. Wash., XIII, 1899, 93 (Santa Marta, Colombia).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Lagunaria and Santa Maria de Dota (Basulto), Bonilla (Ridgway), El Naránjo (Zeledón) (Alfaro), Sarchi (Cooper).

Bangs Collection: Carrillo, Cerro de Santa Maria, La Hondura, Cariblanco de Sarapiquí (Underwood).

Carnegie Museum : Juan Viñas and Ujurrás de Térraba (Carriker).

Three skins.

This species is confined principally to the highlands, descending occasionally as low as 1,500 feet, and going up to at least 6,000 feet. The zone of its greatest abundance lies between 2,000 and 4,000 feet. It is found in the heavy forest, but is also very fond of wooded pastures, becoming very common on the eastern portion of the plateau region, especially from Turrialba up to Santiago.

318. *Melanerpes formicivorus striatipectus* Ridgway.

*Melanerpes formicivorus* CABANIS, Jour. für Orn., 1862, 322 (Irazú [Hoffmann]).

— LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (San José and Barránca [Carmioli], Dota and Birris [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 364 (Grecia, Potrero, Cervantes). — BOUCARD, P. Z. S., 1878, 49 (Volcan de Irazú, — seen at Juan Viñas). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 497 (Irazú [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Cartago, Monte Redondo, Barránca, Zarcero de Alajuela, La Palma de San José). — HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 149 *part* (Dota [Carmioli], San José [Frantzius], Volcan de Irazú [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 412, *part* (Mexico to Panama).

*Melanerpes formicivorus*, var. *striatipectus* RIDGWAY, in Baird, Brewer, and Ridgway, North Am. Birds, II, 1875, 561 (south of Orizaba, Mexico).

U. S. Nat. Museum : Monte Redondo and Coliblanco (Ridgway), El Zarcero (Zeledón), Volcan de Irazú (Cooper), El Copey, La Lagunaria and Santa Maria de Dota (Basulto).

Bangs Collection : Escazú, Azahar de Cartago, Volcan de Irazú (Underwood).

Carnegie Museum : Volcan de Irazú (Carriker) ; Escazú and La Estrella de Cartago (Underwood). Seven skins.

This woodpecker has been taken in a great many localities scattered about over the highlands and mountains of Costa Rica, but from my own experience I find that it is much commoner on the Volcan de Irazú than in any other locality. When I went to the Volcan de Turrialba I fully expected to find the bird there, but to my surprise not a single bird was seen in nearly two weeks collecting, neither did Messrs. Ridgway, Zeledón, or Lankester find it there. I questioned the *peons* on the "hacienda" where I was stopping, concerning the matter, describing the bird to them, but none had ever seen it, although two men who had worked on Irazú knew the bird there, but said they had never seen it on Turrialba. It is a very unusual case of distribution,

since the two peaks are in plain sight of each other, and not more than ten or twelve miles apart. On Irazú I found it almost entirely in the trees scattered through the pastures and fields and along the roadsides. It was breeding in April.

### 319. *Melanerpes chrysauchen* Salvin.

*Melanerpes chrysauchen* SALVIN, P. Z. S., 1870, 213 (Bugába, Panama [Arcé]). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 537 (Pózo Azul de Pirris [Zeledón]); Expl. Zool. en C. R., 1890-1, 46 (Lagarto and Terraba). — HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 160 (Panama). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 414 (Panama). — BANGS, Auk, XXIV, 1907, 292 (Boruca, Paso Real and El Pózo de Terraba [Underwood]).

U. S. Nat. Museum : Pózo Azul de Pirris (Underwood).

Bangs Collection : Pózo Azul de Pirris (Underwood).

Carnegie Museum : Pózo Azul de Pirris and Boruca (Carriker). Four skins.

This handsome *Melanerpes* was first taken in Costa Rica by Zeledón at Pózo Azul de Pirris in September, 1889 (Cherrie, Proc. U. S. Nat. Mus., XIV, 1891, 537). It was taken by Cherrie in the Terraba Valley in 1890-1, and subsequently by Underwood and myself at both Pózo Azul and Terraba. Its Costa Rican range is restricted to the southwestern portion of the country in the Pacific lowlands, from near sea-level up to at least 1,500 feet in the hills around Boruca, where it is fairly common, but is more abundant in the scattered trees of the open "sabanas" than in the forest.

### 320. *Melanerpes pucherani* (Malherbe).

*Zebrapicus pucherani* MALHERBE, Rev. Zool., 1849, 542 (Tobago).

*Centurus pucherani* BOUCARD, P. Z. S., 1878, 49 (San Carlos and Juan Viñas).

*Melanerpes pucherani* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Talamanca, Cartago, Jiménez, Rancho Redondo). — HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 164 (San José [Carmioli], Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 415 (Mexico to W. Ecuador).

*Tripsurus pucherani* SALVADORI, Atti. R. Acc. Sci. Torino, 1868, 183 (Costa Rica [Durando]).

*Centurus generii* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (San José [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 364 (Costa Rica).

U. S. Nat. Museum : Guayábo (Ridgway and Zeledón), Bonilla (Ridgway) (Basulto), Carrillo (Underwood), Pacuarito (Cherrie), Jiménez (Alfaro), Reventazón (Carranza).

Bangs Collection : Jiménez, La Vijagua, Carrillo (Underwood).

C. H. Lankester Collection : San José.

Carnegie Museum: Guápiles (Carriker & Crawford); Guácimo, Cuábre, Rio Sicsola, Carrillo, El Hogar (Carriker). Eighteen skins.

This species is very common over the whole of the Caribbean slope, from near sea-level up to 4,000 feet, where it occurs in small numbers, being much more abundant below 3,000 feet. It is not often found in the thick forest, much preferring open woodland, wooded pastures, and the banks of rivers. I found it very abundant at Guápiles.

321. *Melanerpes wagleri wagleri* Salvin and Godman.

*Picus tricolor* WAGLER, Isis, 1829, 512.

*Melanerpes tricolor* HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 174 (Panama and Colombia). — CHERRIE, Expl. Zool. en C. R., 1890-1, 47 (Palmar, Lagarto, and Buenos Aires de Térraba).

*Melanerpes wagleri* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 416 (Panama to Venezuela). — BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 107 (Pózo Azul de Pirris, one ♂, July 9, 1903 [Underwood]); Auk, XXIV, 1907, 292 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

Carnegie Museum : Buenos Aires de Térraba, Sept., 1907 (Carriker). Five specimens.

This woodpecker was first taken in Costa Rica by Geo. K. Cherrie, in the Térraba Valley in 1890-1, and recorded by him (Expl. Zool. en C. R., 47). The next record we have is the bird taken by Underwood at Pózo Azul de Pirris in 1903. In 1907 Underwood took a large series of birds in the Térraba Valley, where it is one of the commonest woodpeckers. I saw quite a number of them around Buenos Aires, where it frequents open woodland along the streams.

From the known records it would seem that like *M. chrysauchen*, it is present in Costa Rica only in the extreme southwestern portion of the Pacific lowlands.

322. *Melanerpes hoffmanni* (Cabanis).

*Centurus hoffmanni* CABANIS, Jour. für Orn., 1862, 322 (Costa Rica [Hoffmann and Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (San José [J. Carmiol], Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 364 (Grecia). — BOUCARD, P. Z. S., 1878, 49 (San José and Puntarenas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (San José, Cartago and Alajuela). — CHERRIE, Auk, IX, 1892, 327 (San José).

*Melanerpes hoffmanni* HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 181 (San José [Calleja and Carmiol], Puntarenas [O. Salvin]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 419 (Nicaragua and Costa Rica). — UNDERWOOD, Ibis, 1896, 443 (Miravalles).

*Centurus aurifrons hoffmanni* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 398 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 501 (San José [Nutting]).

U. S. Nat. Museum: Guayábo and Pígres (Ridgway and Zeledón), Bonilla and Santo Domingo (Ridgway), San José (Castro), Guayabal (Underwood).

Bangs Collection: Cerro de Santa Maria, Carrillo, Tenorio, San José, Escazú, Bolson (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Juan Viñas, San Mateo (Carriker). Five skins.

This species takes the place of *M. pucherani* on the Pacific slope and the central plateau region, although the ranges of the two birds slightly overlap, the present bird occurring occasionally on the Caribbean slope (Juan Viñas and Guápiles). It is the common woodpecker of the highlands and Pacific coast, although not so abundant in individuals as *M. pucherani* on the eastern side. It is also found in more open country, rarely being seen in heavy forest.

### 323. *Dryobates villosus extimus* (Bangs).

*Picus harrisii* CABANIS, Jour. für Orn., 1862, 175 (Desengaño [Hoffmann]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 130 (Costa Rica).

*Picus jardinii* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 130 (San José and Cervantes [J. Carmiol], Birris [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 364 (Candelaria Mts.).

*Dyctiopicus jardinii* BOUCARD, P. Z. S., 1878, 49 (Volcan de Irazú and Navárrro).

*Dryobates jardinii* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (slopes of Irazú). — CHERRIE, Auk, IX, 1892, 327 (San José (?), — skins labelled San José, but locality is very doubtful).

*Dendrocopus jardinii* HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 237 (Volcan de Irazú [Arcé and Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 432 (Mexico to Panama).

*Dendrocopus villosus extimus* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 33 (Chiriquí [Brown]).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San Juan de Irazú (Alfaro), Volcan de Irazú, La Estrella de Cartago and Coliblanco (Castro), El Copey, La Lagunaria, Las Vueltas, and Santa Maria de Dota (Basulto).

Bangs Collection: Volcan de Irazú, Volcan de Barba, and Azahár de Cartago (Underwood).

Carnegie Museum: Volcan de Irazú, Volcan de Turrialba, Ujurrás de Térraba, La Hondura (Carriker); La Estrella de Cartago, Escazú, and Azahár de Cartago (Underwood). Sixteen skins.



A common resident in all portions of the country above 6,000 feet, sometimes taken down as low as 4,000 feet, but most abundant on the high volcanoes. I found it the commonest woodpecker on the Volcan de Irazú, and not only abundant, but the only species on the Volcan de Turrialba, where it is present right up to timber-line.

It is normally an inhabitant of the thick damp forests found everywhere at the altitude which it frequents, although it seems to have adapted itself to the changed conditions on the high volcanoes, which have been cleared of the forest in many places, the land now having been made into pastures, with many trees scattered through them. Here the birds seem to be perfectly at home and find conditions suitable for their increase.

### 324. *Veniliornis caboti* (Malherbe).

*Mesopicus caboti* MALHERBE, Mon. Pic., II, 1862, 53, pl. 57, fig. 1 and 2.

*Chloronerpes oleagineus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 131 (Barránca and Turrialba [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 364 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Costa Rica). — RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 476 (Jiménez [Alfaro]).

*Dendrobates caboti* HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 344 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, II, 1895, 438 (Mexico to Panama).

*Veniliornis caboti* OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1899, 204 (critical).

U. S. Nat. Museum: San Bernardo (Alfaro and Carranza), Jiménez (Alfaro).

Bangs Collection: El General de Térraba and La Hondura (Underwood).

Carnegie Museum: Guácimo (Carriker). One skin.

This is a very rare woodpecker in Costa Rica, but few specimens having been taken in that country. In all my collecting I never met with but one, which I secured in the heavy forest at Guácimo. All but one of the published records and all of the skins examined came from the Caribbean slope, between 800 and 4,000 feet. There is but one record for the Pacific slope, Lawrence recording one or more specimens from Barránca, collected by J. Carmiol.

### 325. *Veniliornis neglectus* Bangs.

*Dendrobates ceciliae* HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 366, *part* (Chiriquí to Colombia). — CHERRIE, Expl. Zool. en C. R., 1890-1, 46 (Palmar de Térraba, one specimen). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 440, *part* (Panama to Ecuador).

*Veniliornis neglectus* BANGS, Proc. New Eng. Zool. Club, II, 1901, 99 (Divala, Chiriquí, Nov. 9, 1900 [W. W. Brown]; coll. E. A. and O. Bangs); Auk, XXIV, 1907, 293 (El Pózo de Térraba, three specimens (Underwood)).

Bangs Collection : Pózo Azul de Pirris (Underwood).

Carnegie Museum : El Pózo de Térraba (Carriker). Three specimens.

This bird was first taken in Costa Rica by Cherrie at Palmar de Térraba, where he secured one specimen, recording it as *Dendrobates ceciliae* (Expl. Zool., 46). He says that it must be a very rare bird, for but one was seen. In 1906 Underwood secured three birds at El Pózo, a few miles down the Rio Grande from Palmar, and in 1907 I also secured three birds at the same place, finding them in some low trees on the edge of a new clearing near the river. The three birds were all together in the same tree, and I was fortunate to secure them all, for no others were seen during the trip.

### 326. *Celeus loricatus* (Reichenbach).

*Meiglyptes loricatus* REICHENBACH, Scansores Picinae, 1854, 405, pl. 681, fig. 4495-6.

*Celeus loricatus* SCLATER and SALVIN, P. Z. S., 1879, 533. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Talamanca and Jiménez, three specimens). — HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 432 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 442 (Costa Rica to Ecuador).

Bangs Collection : Carrillo (Underwood).

C. H. Lankester Collection : Guácimo.

Carnegie Museum : Carrillo and Rio Sicsola (Carriker). Three specimens.

This handsome species is not only very rare in Costa Rica, but throughout its extensive range. Lawrence described a female from Panama under the name of *C. squamatus*, which was probably only a well marked adult. I have not been able to make a satisfactory comparison of Costa Rican and Panaman specimens of this species with birds from the supposed type locality (Peru), but one poor skin from Ecuador being available, from which nothing could be definitely learned concerning their real relationship. Costa Rican and Panaman skins are identical, but it is not improbable that when compared with good South American material they will prove to be subspecifically distinct, in which case Cassin's name of *C. mentalis* will become available for the northern subspecies.

I succeeded in securing but three specimens of this rare bird in

Costa Rica, all adults in good plumage, and all were taken in the forest along the Sicsola River at not more than 100 feet above sea-level. They were all taken rather low down on the tree-trunks.

327. *Celeus castaneus* (Wagler).

*Picus castaneus* WAGLER, Isis, 1829, 515.

*Celeus castaneus* SCLATER, P. Z. S., 1858, 359. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 130 (Angostura [F. Carmiol], Turrialba [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 364 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 124 (Pacuare and Turrialba, two specimens). — HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 433 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, II, 1895, 441 (Mexico to Costa Rica).

Bangs Collection: Limon and La Vijagua (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Fleming Collection: Jiménez (Underwood).

Carnegie Museum: Guácimo, Rio Sicsola (Carriker). Five specimens.

*Celeus castaneus* is also a rare woodpecker not only in Costa Rica, but throughout its whole range, although I believe it is more abundant in Costa Rica than its near relative, *C. loricatus*. Like the preceding species it is confined entirely to the heavy forests of the hot lowlands of the Caribbean coast, and is very rarely met with. I have always seen them in pairs, and have always managed to secure nearly all birds seen. I found it in the same locality with *loricatus* on the Rio Sicsola.

328. *Campephilus guatemalensis buxans* Bangs.

*Picus guatemalensis* HARTLAUB, Rev. Zool., 1844, 214.

*Scapanus guatemalensis* CABANIS, Jour. für Orn., 1862, 175 (Lepanto [Ellendorf], C. R. [Frantzius and Hoffmann]).

*Campephilus guatemalensis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 130 (San José [Frantzius], Angostura [J. Carmiol], Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 363 (Dota and Candelaria Mts.). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 398 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (Grecia, Jiménez, Las Trojas, Cartago). — CHERRIE, Auk, IX, 1892, 327 (San José, — accidental). — UNDERWOOD, Ibis, 1896, 443 (Miravalles).

*Campephilus guatemalensis* CHERRIE, Expl. Zool. en C. R., 1890-1, 46 (Lagarto and Boruca). — HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 473 *part* (Bebedéro [Arcé], San José [Frantzius], Dota [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am. Aves, II, 1895, 446, *part* (Mexico to Panama).

*Campephilus guatemalensis buxans* BANGS, Auk, XVIII, 1901, 360 (David, Chiriquí [Brown]); XXIV, 1907, 293 (Boruca and El Pózo de Térraba, Barranca de Puntarenas [Underwood]).

U. S. Nat. Museum: Guayábo and Pígres (Ridgway and Zeledón), Bonilla (Ridgway) (Basulto), Santo Domingo de San Mateo (Alfaro), El Copey and Santa Maria de Dota (Basulto), Bebedéro (Underwood), Reventazón (Carranza).

Bangs Collection: Pózo Azul de Pirrís, La Palma de San José, Bolson, Tenorio (Underwood).

C. H. Lankester Collection: La Cristina (= Jiménez).

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirrís, Guácimo, Cuábre, El Hogar, Bebedéro (Carriker). Eighteen skins.

This is a southern form of *C. guatemalensis*, distinguished by its smaller size and much more yellowish under parts and under wing-coverts, and is probably confined to Nicaragua, Costa Rica, and Panama, although specimens from northern Nicaragua show signs of intergradation. Costa Rican birds are nearly typical *buxans*.

This bird has a very wide range in Costa Rica, being found on both coasts in abundance, and in smaller numbers up over the plateau region, wherever heavy virgin forest is found. It is an extremely hardy bird and very tenacious of life, carrying away with no apparent inconvenience heavy charges of shot at close range. It is usually seen in pairs, each pair seeming to occupy a certain small district, into which no others intrude.

### 329. *Ceophlæus lineatus lineatus* (Linnæus).

*Picus lineatus* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 174.

*Ceophlæus lineatus* HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 508 (Brazil and Peru, north into Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 451 (Chiriquí, southward). — BANGS, Auk, XXIV, 1907, 293 (Boruca, El Pózo and Paso Real de Térraba [Underwood]).

U. S. Nat. Museum: Pígres (Ridgway and Zeledón).

Bangs Collection: El General de Térraba (Underwood).

Carnegie Museum: Guápiles, ♂ (Carriker and Crawford); Pózo Azul de Pirrís, El Pózo de Térraba (Carriker). Four skins.

In the Catalogue of the Birds of the British Museum, Hargitt mentions the fact that Costa Rican examples of *C. lineatus* were not quite typical, but he did not think them separable. I find that all birds from southwestern Costa Rica are very close to true *lineatus* of South America, some even being indistinguishable from them, but as one goes northward they gradually become intermediates between *line-*

*atus* and *scapularis*, until in the northwestern and northeastern portions (with a few exceptions) nearly all birds are very close to *scapularis*, some being quite typical of that form. With such intergradation present, it becomes impossible to recognize *C. scapularis* and *lineatus* as distinct species, and accordingly *scapularis* becomes a subspecies of *lineatus*, the latter being the one first described.

This bird is not common on the Caribbean slope, there being very few records for it from that region, neither is it found on the plateau region. Its zone of greatest abundance is in the lowlands of the Pacific, up to about 2,000 feet. I did not take it at all in southeastern Costa Rica, nor do I recollect of ever having seen the bird there, but did take it in the northeastern portion, so that it would seem that the bird crosses from the Caribbean over to the Pacific at the depression of land lying along the boundary between Costa Rica and Nicaragua.

### 330. *Ceophlæus lineatus scapularis* (Vigors).

*Picus scapularis* VIGORS, Zool. Jour., IV, 1829, 354 (San Blas, Mexico).

*Dryocopus scapularis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 130 (Costa Rica [Frantzius] "Cabanis").—FRANTZIUS, Jour. für Orn., 1869, 364 (Costa Rica).

*Ceophlæus scapularis* CABANIS, Jour. für Orn., 1862, 176 (Aguacate Mts. [Frantzius]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 123 (La Candelaria). — HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 510 (Costa Rica [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 450 (Mexico to Costa Rica). — BANGS, Auk, XXIV, 1907, 293 (Barránca de Puntarenas [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Basulto).

Bangs Collection: Bolson, Tenorio and Pózo Azul de Pirrís (Underwood).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Volcan de Turrialba, 2,000 feet, northern slope (Carriker & Crawford); Boruca (Carriker). Two specimens.

In placing references to these two races in Costa Rica it is impossible to be certain about them without seeing the specimens themselves, for the birds of both forms crop out in most unexpected places. For example, I took a nearly typical specimen of *lineatus* at Guápiles, in northeastern Costa Rica, while one specimen from Boruca is just as nearly typical of the northern race, *scapularis*. The birds no doubt interbreed in Costa Rica, and it is only perfectly natural that intermediate

birds should occur as well as occasionally a reversion to the type of one form or the other, hence the occasional specimens nearly typical of the northern or southern race which are taken in localities where the opposite form is predominant.

See notes on preceding species for range, etc.

330. ***Picumnus olivaceus flavotinctus*** (Ridgway).

*Picumnus olivaceus* LAFRESNAYE, Rev. Zool., 1845, 7, 111 (Bogotá). — CHERRIE, Expl. Zool. en C. R., 1890-1, 46 (Palmar, Boruca, Térraba, and Buenos Aires). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1895, 452, *part* (Honduras to Ecuador).

*Picumnus granadensis* HARGITT, Cat. Birds Brit. Mus., XVIII, 1890, 549, *part* (Chiriquí and Panama).

*Picumnus flavotinctus* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 543 (Pózo Azul de Pirrís, Sept., 1886 [Alfaro]).

*Picumnus olivaceus flavotinctus* BANGS, Auk, XXIV, 1907, 293 (Boruca, Paso Real and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum : Pózo Azul de Pirrís (Alfaro).

Bangs Collection : El General de Térraba and Pózo Azul de Pirrís (Underwood).

Carnegie Museum : Boruca and Buenos Aires de Térraba (Carriker).  
Twelve skins.

This tiny little woodpecker is found in Costa Rica only in the extreme southwestern portion of the Pacific lowlands, from Chiriquí north to Pózo Azul de Pirrís, but is quite abundant in some localities in this area. It is usually found in low, vine-covered jungle, near streams, rather than in the heavy virgin forest, although it is present there also. It is always seen in pairs and is very tame and easily approached.

Family PTEROPTOCHIDÆ.

332. ***Scytalopus argentifrons*** Ridgway.

*Scytalopus argentifrons* RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 475 (Volcan de Irazú, Costa Rica, April 23, 1891 [A. Alfaro]; Coll. U. S. Nat. Mus.), XVI, 1893, 613 (Volcan de Irazú). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 246 (reference to descr.).

U. S. Nat. Museum : San Juan de Irazú (Ridgway and Alfaro) ; La Estrella de Cartago.

Bangs Collection : Volcan de Irazú (Underwood).

Fleming Collection : Volcan de Irazú and Carrillo (?) (Underwood).

Carnegie Museum : Volcan de Irazú, Ujurrás de Térraba, Volcan de Turrialba (Carriker). Thirteen skins.

Few specimens of this bird are collected in the fully adult plumage, having the prominent silvery streak on each side of the pileum. It is quite probable that the birds acquire this gradually, and that the older the bird, the more pronounced becomes the silvery color.

The species ranges over the whole of the interior of the country, from an altitude of perhaps 6,000 feet up to the timber-line on the high volcanoes. In Mr. Fleming's collection is a skin taken by Underwood and labelled "Carrillo," which is undoubtedly an error, the skin probably having become mixed with other birds from Carrillo and labelled wrongly. In a month's collecting there I never saw the bird, neither did I get it at La Hondura, higher up the Rio Súcio gorge at not less than 4,000 feet, although conditions there seemed very favorable for its presence. It is partial to cold humid forests, and always keeps on or near the ground, among the masses of brush and ferns found at high altitudes where there is much moisture. I found them quite common at Ujurrás de Térraba, high up on the crest of the continental divide, and had very good opportunities to study them in life. (For additional notes on habits, see page 332, Introduction.)

#### Family FORMICARIIDÆ.

##### KEY TO THE COSTA RICAN SPECIES.

- I. Tail equal in length to wing, or if shorter, the difference not greater than the length of the hind claw.
  - a. Either barred or spotted prominently both above and below.
    - b. Heavily spotted with black over back, wings, and breast; throat black; chest chestnut. *Phænostictus macleani saturatus*, ♂, ♀.
    - bb. Barred above and below, but not spotted.
      - c. Black above and below, finely barred throughout (except pileum) with white. *Cymbilanius lineatus fasciatus*, ♂.
      - cc. Black above (except chestnut pileum), narrowly barred with buff-ochraceous; buff-ochraceous below, finely barred with black. *Cymbilanius lineatus fasciatus*, ♀.
  - aa. Neither barred nor spotted above or below.
    - b. Entire body black or very dark ashy, with more or less white on shoulders or wing-coverts.
      - c. Whole body almost entirely black, no ashy below.
        - d. Size small (wing 50 mm.); wing-coverts tipped with roundish white spots, shoulder white and tail tipped with white. *Formicivora boucardi virgata*, ♂.
        - dd. Size larger (wing 80 mm.); entirely black, except edge of shoulder white. *Myrmeciza immaculata*, ♂.
      - cc. Ashy black above and grayish-ash below, shoulder white, wing-coverts black, tipped with white. *Cercomacra tyrannina crepera*, ♂.

*bb.* Only back black or else no black except on tail, wings and head.

*c.* Back black with concealed white; wing-coverts tipped with round white spots; entire lower parts reddish-chestnut; size small (wing 50 mm.).

*! Formicivora boucardi virgata, ♀.*

*cc.* Back not black.

*d.* Upper and lower parts umber-brown, paler below; lores, narrow superciliary line, chin, sides of head and rectrices, black.

*Myrmelastes immaculatus, ♀.*

*dd.* Upper parts olive-brown, lower parts cinnamon-ochraceous; wings and tail darker olive-brown. *Cercomacra tyrannina crepera, ♀.*

*II.* Tail at least half the length of the wing, usually more, but always shorter by much more than the length of the hind claw.

*a.* Upper parts entirely black, slaty-black, or slate-gray mixed with black, but never with olive or brownish tinge; with or without concealed white.

*b.* Under parts entirely black, slate-gray, or black and slate-gray, never partially white.

*c.* Under parts deep black, like above.

*d.* Whole crown bare of feathers (blue in life); white edging to wing-coverts very narrow (.5 to 1 mm.).

*Gymnocichla nudiceps erratilis, ♂.*

*dd.* Only front of crown, from middle of eye forward, bare of feathers; white edgings to coverts broader (1 to 2 mm.).

*Gymnocichla cheiroleuca, ♂.*

*cc.* Under parts wholly or partially slate-gray.

*d.* Throat and chest black, rest below slate-gray; wing-coverts tipped with white.

*e.* Size larger (wing, 73; tail, 65 mm.); upper parts deep black.

*Thamnophilus bridgesi, ♂.*

*ee.* Size smaller (wing, 54; tail, 38 mm.); upper parts slate-gray.

*Myrmotherula ménétréi schisticolor, ♂.*

*dd.* Entire under parts deep ashy-gray; pileum and stripe down middle of back black, rest above ashy-gray; wing-coverts and scapulars broadly edged with white. *Thamnophilus nævius atrinucha, ♂.*

*bb.* Under parts partially or wholly white.

*c.* Entirely white below, except flanks and under tail-coverts black, wing-coverts tipped with white; size larger (wing, 90).

*Thamnophilus transandeanus, ♂.*

*cc.* Only sides and flanks white; rest below either black or slate-gray (wing, 55).

*d.* Under parts (except flanks) deep black. *Myrmotherula melana, ♂.*

*dd.* Under parts slate-gray, blackish in middle of breast, upper parts slate-gray. *Myrmotherula axillaris, ♂ (extralimital).*

*aa.* Upper parts (except sometimes pileum) not black, or, if black, thickly barred with white.

*b.* Entire upper parts black, thickly barred with white, except pileum which is streaked (mostly concealed); lower parts white, barred with black.



- c. White bars above broader and more conspicuous, lower parts with much more white than black (Pacific slope).  
*Thamnophilus doliatus pacificus*, ♂.
- cc. White bars above narrow, black and white about evenly divided below; (Carribean slope).  
*Thamnophilus doliatus mexicanus*, ♂.
- bb. Upper parts never barred with white, and never black, except sometimes on pileum.
- c. Under parts uniformly buff-ochraceous, or bright cinnamon-brown.
- d. Bright chestnut-brown above, sides of head and nuchal collar streaked with black and buffy.  
*Thamnophilus doliatus pacificus* and *mexicanus*, ♀.
- dd. Upper parts dull grayish-olive or sepia-brown.
- e. Under parts bright cinnamon-brown; size larger (wing, 75 mm.).
- f. Upper parts uniform light sepia; wing-coverts dusky brown, tipped with chestnut.  
*Gymnocichla nudiceps erratilis*, ♀.
- ff. Upper parts dark sepia, pileum paler; wings brighter brown, coverts blackish, without lighter tips.  
*Gymnocichla cheiroleuca*, ♀.
- ee. Under parts bright buff-ochraceous, under tail-coverts ruddier; above dull grayish-olive; smaller (wing, 55).  
*Myrmotherula ménétréi schisticolor*, ♀.
- cc. Under parts variously colored, but never as above.
- d. Under tail-coverts dark brown or chestnut, and may or may not be a different color from abdomen, but never mixed with white.
- e. Under parts (except flanks and vent) uniform slaty-black or pure white.
- f. Under parts pure white, above rich chestnut-rufous.  
*Thamnophilus transandeanus*, ♀.
- ff. Under parts uniform slaty-black, also pileum.
- g. Lesser and middle wing-coverts black in abrupt contrast to the brown quills, and tipped with white; concealed white on back; black of crown extending over upper back.  
*Myrmeciza læmosticta*, ♂.
- gg. Wing-coverts concolorous with wing and back (chestnut-brown); no concealed white on back, and black confined to pileum.
- h. Lower parts more slaty (Pacific).  
*Myrmeciza occidentalis*, ♂.
- hh. Lower parts more black (Carribean).  
*Myrmeciza exsul*, ♂.
- ee. Under parts variouly colored, but never slaty-black or white.
- f. Throat deep black (not slaty), unmarked.
- g. Whole chest and breast bright chestnut-rufous; upper tail-coverts concolorous with lower, in abrupt contrast to the rich olive-sepia of back.  
*Formicarius rufipectus*, ♂, ♀.
- gg. Chest dark ashy-olive or sooty-gray, slightly darker than breast and abdomen; upper parts rich seal-brown or bistre.

- h. More or less of a chestnut-brown patch on sides of neck.  
 i. Brown on sides of neck confined to the postocular region, scarcely visible from below.  
*Formicarius umbrosus*, ♂, ♀.
- ii. Brown patch passing around on front of throat, almost meeting on jugulum, forming an interrupted jugular collar; lower parts dull grayish-olive.  
*Formicarius hoffmanni*, ♂, ♀.
- hh. No brown on sides of neck; whole head, neck, and chest black, breast fading into sooty-slate on abdomen and flanks.  
*Formicarius nigricapillus*, ♂, ♀.
- ff. Throat slate-color or else black, spotted with white.  
 g. Chest concolorous with abdomen or bright brown, not slaty; throat slate-color.  
 h. Lower parts dark seal-brown; whole pileum and nape slaty-black (Carribean lowlands). *Myrmeciza exsul*, ♀.
- hh. Lower parts rich ruddy-brown, only fore part of pileum slaty-black; (Pacific lowlands).  
*Myrmeciza occidentalis*, ♀.
- gg. Chest dark slate-color; throat black, spotted with white; flanks and back dark, rich brown.  
*Myrmeciza læmosticta*, ♀.
- dd. Under tail-coverts variously colored, but not uniformly brown or chestnut.  
 e. Back bright chestnut-brown, wing-coverts and tertials broadly tipped with cinnamon-buff or brown.  
 f. Throat black; breast white, heavily spotted with black; flanks ashy.  
*Hylophylax navioides*, ♂.
- ff. Throat whitish; spots on chest olive-brown; flanks grayish-olive.  
*Hylophylax navioides*, ♀.
- ee. Back not bright chestnut-brown.  
 f. Whole throat and median portion of chest and breast pure white; upper parts dark seal-brown.  
*Gymnopathys bicolor olivascens*, ♂, ♀.
- ff. Throat and breast not white (immaculate).  
 g. Throat or chest or both, streaked or mottled with white and black or dusky; never uniformly colored.  
 h. Sides of head and neck cinnamon-buff.  
 i. Bill long and slender (longer than tarsus); throat indistinctly mixed with white and blackish; rest of lower parts bright buffy. *Rhamphocænus rufiventris*, ♂, ♀.
- ii. Bill shorter than tarsus; centre of throat whitish, surrounded by black; breast ashy; flanks dull grayish-brown.  
*Rhamphocænus semitorquatus*, ♂, ♀.
- hh. Sides of head and neck not cinnamon-buffy.  
 i. Middle and greater wing-coverts prominently tipped with buff-ochraceous or white.

- j. Throat feathers black, white terminally; chest not streaked; uniformly grayish-olive above; breast and abdomen dull buffy-olive.

*Myrmotherula fulviventrīs*, ♀.

- jj. Throat feathers not black basally; chest streaked; upper parts grayish-olive or olive-brown.

- k. Pileum slate-gray or buffy-brown, streaked with black, but never spotted; back grayish-olive.

- l. Pileum slate-gray, throat and chest ashy, streaked with white and black; flanks buffy-olive.

*Dysithamnus striaticeps*, ♂.

- ll. Pileum brown; under parts nearly uniformly buff-ochraceous, finely penciled with black on throat and chest.

*Dysithamnus striaticeps*, ♀.

- kk. Pileum black, spotted with white or with buff-ochraceous.

- l. Upper part slate-gray, spots on head white; below white, breast streaked with black; sides, flanks, and belly cinereous.

*Dysithamnus puncticeps*, ♂ (extralimital).

- ll. Upper parts brownish, spots on head rufous; abdomen pale fulvous.

*Dysithamnus puncticeps*, ♀ (extralimital).

- ii. Middle and greater wing-coverts not tipped with white (only lesser); pileum black, penciled with white; lower parts grayish-olive, streaked on throat and breast with white.

*Thamnophilus bridgesi*, ♀.

- gg. Neither throat nor chest streaked or mottled.

- h. Wings and tail bright chestnut-rufous; upper parts rich brownish-olive, below yellowish-olive.

*Thamnistes anabatinus saturatus*, ♂, ♀.

- hh. Wings and tail not rufous-chestnut.

- i. Back and wings grayish-olive, with a decided greenish tinge; pileum slate-gray.

- j. Throat and chest pale ashy, slightly mixed with white; abdomen pale yellow, flanks olive.

*Dysithamnus mentalis septentrionalis*, ♂.

- jj. Chest olive, like flanks; grayish-white of throat slightly greenish.

*Dysithamnus mentalis septentrionalis*, ♀.

- ii. Back and wings grayish-brown or brownish-ash; pileum nearly or quite concolorous with back.

- j. Size larger (wing, 65 mm.); decidedly brownish above; wing-coverts tipped with buffy and lower parts dull grayish-buffy, with slight olive tinge; tail tipped with white.

*Thamnophilus nævius atrinucha*, ♀.

- jj. Size smaller (wing, 52 mm.); brownish-ashy above.

- k.* Wing-coverts conspicuously tipped with buff-ochraceous; lower parts quite uniformly deep buff-ochraceous. *Myrmotherula fulviventris*, ♀.
- kk.* Wing-coverts not conspicuously tipped (if at all); throat and flanks paler buff than breast. *Myrmotherula axillaris*, ♀ (extralimital).  
*Myrmotherula melæna*, ♀.
- III.** Tail much less than half the length of the wing (usually about one third); legs strong and long. (Terrestrial forms.)
- a.* Size large (wing, 95 to 110 mm.).
- b.* Lower parts strongly barred with black and white; pileum black; back and wings rich seal-brown, middle of back slightly streaked with black.
- c.* Throat black. *Pittasoma michleri zeledoni*, ♂.
- cc.* Throat barred with buffy-white. *Pittasoma michleri zeledoni*, ♀.
- bb.* Lower parts plain cinnamon-brown, with some dusky mottling on throat; pileum ashy; back olive-green, feathers edged with black; wings rich brown. *Grallaria guatemalensis princeps*, ♂, ♀.
- b.* Flanks and under tail-coverts cinnamon-buffy or cinnamon-rufous; upper parts dark ashy with a few buffy streaks or spots on scapulars; throat white.
- c.* Cinnamon-buffy confined to flanks and under tail-coverts; breast buffy-white, heavily streaked with black. *Hylopezus intermedius*, ♂, ♀.
- cc.* Cinnamon-rufous covering chest as well as sides, flanks, and under tail-coverts; black streaks on chest narrow and irregular. *Hylopezus dives*, ♂, ♀.
- bb.* Flanks and under tail-coverts white or only slightly tinged with olive-buff; throat and belly white; back ashy olive-brown.
- c.* Chest cinnamon-rufous, scarcely streaked; pileum nearly color of back; size small (wing, 60 mm.). *Grallaricula flavirostris costaricensis*, ♂, ♀.
- cc.* Chest buff-ochraceous, broadly streaked with black; pileum ashy-olive; size larger (wing, 80 mm.). *Hylopezus lizanoi*, ♂, ♀.

### 333. *Cymbilanius lineatus fasciatus* Ridgway.

- Cymbilanius lineatus* GRAY, Gen. Birds, 1840, 36. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (Angostura [J. Carmiol]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 178, *part* (Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 194, *part* (Costa Rican references).
- Cymbilanius lineatus fasciatus* RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 415 (Rio Súcio [Cooper]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Jiménez). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 499 (Rio Frio, Rio Súcio, Sipúrio, Angostura).
- U. S. Nat. Museum: Guayábo and Bonilla (Ridgway and Zeledón), Jiménez (Alfaro) (Verrill) (Cherrie) (Castro).
- Bangs Collection: La Vijagua and Carrillo; three specimens (Underwood).

Carnegie Museum: Carrillo, El Hogar, Cuábre de Talamanca (Carriker). Six specimens.

Confined entirely to the Caribbean lowlands and foot-hills, below 2,000 feet. It is quite a rare bird in Costa Rica, and not often taken. They inhabit the thick jungle in places where there are not many large trees to keep out the sun, permitting the undergrowth to become very dense. I also found them in patches of wild cane along the Sicsola River. They are almost entirely arboreal in their habits, very quiet, and not easily alarmed; and, if they have any call, I never heard it.

### 334. *Thamnophilus transandeanus* Sclater.

*Thamnophilus transandeanus* SCLATER, P. Z. S., 1855, 18 (Guayaquil, Ecuador). Cat. Birds Brit. Mus., XV, 1890, 185 (Tucurríqui [Arcé]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Jiménez, Las Trojas, and Pacuare). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 198 (Costa Rica to Ecuador; C. R. references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 41 (Palmar, Boruca, Buenos Aires). — BANGS, Auk, XXIV, 1907, 296 (Boruca, El Pózo, Lagarto, and Barranca de Terraba [Underwood]).

*Thamnophilus melanocrissus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (Tucurríqui [Arcé]; coll. O. Salvin).

U. S. Nat. Museum: Jiménez (Verrill) (Alfaro), Pózo Azul de Pirrís (Underwood).

Bangs Collection: El General de Terraba and Pózo Azul de Pirrís (Underwood).

Fleming Collection: Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Guácimo (Carriker & Crawford); Rio Sicsola, El Hogar, El Pózo de Terraba, Boruca (Carriker). Seventeen skins.

This ant-thrush is fairly common in most of the lowlands of both the Caribbean and Pacific, up to about 1,500 feet. Like the preceding species, it is not found in heavy, dark forest, but in wild cane and thick jungle, with only scattering trees here and there. This species is also very fond of the large patches of "wild plantains" so common along the streams of the lowlands and in many places in the forest on the Caribbean side. It is very tame, almost entirely arboreal, and has a rather harsh call, not often heard. It is almost always seen in pairs.

### 335. *Thamnophilus bridgesi* Sclater.

*Thamnophilus bridgesi* SCLATER, P. Z. S., 1856, 356 (David, Chiriquí, Panama [Bridges]); Cat. Birds Brit. Mus., XV, 1890, 194 (no C. R. record). — LAWR-

ENCE, Ann. Lyc. N. Y., IX, 1868, 107 (San Mateo [Cooper]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Las Trojas, Pózo Azul de Pirrís). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 199 (Costa Rica and Panama). — CHERRIE, Auk, X, 1893, 279 (Pacific slope to 2000 feet; critical); Expl. Zool. en C. R., 1890-1, 1893, 41 (Palmar, Boruca, Lagarto, Térraba). — BANGS, Auk, XXIV, 1907, 296 (Boruca, Paso Real, El Pózo and Lagarto de Térraba [Underwood]).

*Thamnophilus punctatus* CABANIS, Jour. für Orn., 1861, 241 (Costa Rica [Hoffmann]). — SALVIN, Ibis, 1870, 110 (Costa Rica [Carmioli]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Las Trojas and Pózo Azul de Pirrís). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 191 (Costa Rica and Veragua). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 198 (Costa Rica and Panama). — CHERRIE, Auk, X, 1893, 279 (critical).

U. S. Nat. Museum: Pózo del Pital (Cherrie), Pózo Azul de Pirrís (Zeledón), Las Trojas (Alfaro), Pígres (Ridgway and Zeledón).

Bangs Collection: Pózo Azul de Pirrís, El General and Buenos Aires de Térraba, Tenorio (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, Boruca, Buenos Aires, El Pózo de Térraba, Esparta (Carriker). Twenty-nine skins.

From 1861 until 1893 the male and female of this *Thamnophilus* were each known under separate names, *T. bridgesi* for the female, and *T. punctatus* for the male. In 1893 Mr. Cherrie pointed out the error, which is easily seen by anyone studying the birds alive, or examining a large series of properly sexed skins. This bird is found only on the Pacific lowlands and in the foot-hills up to not more than 2,000 feet. It is very abundant in the southern part of the country, from Pózo Azul southward, but is found in diminishing numbers as far north as the Volcan de Tenorio (at least) where Mr. Underwood secured a small series in 1908. The birds are usually found in heavy forest, frequenting the undergrowth and low limbs of the trees, and are always seen in pairs or small flocks in company with other ant-thrushes or tanagers. They are very tame and easily approached, seeming to have no fear. They have a rather weak, not unpleasant note, which is usually heard when the bird is unaware of the presence of an intruder. I did not find the nest.

### 336. *Thamnophilus nævius atrinucha* Salvin and Godman.

*Thamnophilus nævius* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (Angostura and Pacuare [J. Carmioli]). — BOUCARD, P. Z. S., 1878, 60 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Angostura).

*Thamnophilus atrinucha* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 200 (type from Panama).

U. S. Nat. Museum: Reventazón (Carranza), Talamanca (Cherrie), Jiménez (Verrill).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guácimo (Carriker & Crawford); Guácimo, Cuábre, Rio Sicsola, El Hogar (Carriker). Fourteen skins.

Upon comparing *T. atrinucha* with *T. nævius* of South America, I find the differences between the two birds too small to admit of specific distinction, and have therefore placed it as a subspecies of *T. nævius*, the form first described.

The range of *T. nævius atrinucha* in Costa Rica is confined to the Caribbean lowlands and lower foot-hills, the bird scarcely ever being found higher than 1,500 feet and then only up the large river-valleys. It is much more abundant in the low flat land lying along the coast, especially along the lower portion of the Sicsola River. It, too, prefers the thick, matted jungle to the heavier forest-growth, and like all the members of the genus is very tame and rather stupid.

I took a single nest of this species on the Sicsola River, August 6, 1904, containing two badly incubated eggs. The nest is of the vireo type, made of rootlets, moss, and weed-fibers, lined with fine, reddish weed-fiber and decorated on the outside with moss. It was hung in a horizontal fork of a small shrub, four feet from the ground, and near a small creek in the deep forest. The outside diameter of the nest is about four and one-half inches; inside three and one-half inches. The eggs are creamy-white, thickly and heavily blotched and speckled with reddish-brown and lilac. Measurements:  $24 \times 16.5$  and  $24.5 \times 17$  mm.

### 337. *Thamnophilus doliatus mexicanus* Allen.

*Lanius doliatus* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 136 (South America).

*Thamnophilus doliatus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114, *part* (Jiménez, Cartago, Naránjo de Cartago). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 207, *part* (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 202, *part* (Costa Rican references).

*Thamnophilus nigricristatus* BOUCARD, P. Z. S., 1878, 60, *part* (San Carlos).

*Thamnophilus doliatus mexicanus* ALLEN, Bull. Am. Mus. Nat. Hist., II, 1889, 151 (Mexico; crit.). — RIDGWAY, Proc. Biol. Soc. Wash., XXI, 1908, 192 (Atlantic slope from southern Tamaulipas, Mexico, to Costa Rica).

Carnegie Museum: Juan Viñas (Carriker). Three males.

The eastern or rather northern race of *T. doliatus* is confined to the northeastern portion of Costa Rica (thence northward) in the Carib-

bean foothills, but does not descend into the lowlands. The only place I saw the bird was at Juan Viñas, where it was found in the thickets of the pastures and on the steep hillsides overgrown with a dense jungle of shrubbery and wild plantains. It was not common and no females were seen; it being the breeding season, the females were probably incubating.

338. *Thamnophilus doliatus pacificus* Ridgway.

*Lanius doliatus* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 136 (Cayenne).

*Thamnophilus doliatus* CABANIS, Jour. für Orn., 1861, 242 (Costa Rica [Frantz]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (citation of Cabanis' record). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114, *part* (Las Trojas and Pózo Azul de Pirrís). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 207, *part* (Nicoya [Arcé], San Mateo [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 202, *part* (Costa Rican references). — CHERRIE, Auk, IX, 1892, 250 (San José, a rare straggler); Expl. Zool. en C. R., 1890-1, 1893, 41 (Lagarto, Boruca, and Buenos Aires). — UNDERWOOD, Ibis, 1896, 440 (Bebedéro). — BANGS, Auk, XXIV, 1907, 296 (Boruca, Paso Real and El Pózo de Térraba [Underwood]).

*Thamnophilus affinis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (San José [Frantz]), San Mateo and Sarchí [Cooper]).

*Thamnophilus nigriristatus* BOUCARD, P. Z. S., 1878, 60, *part* (San Mateo).

*Thamnophilus doliatus affinis* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 396 (La Palma de Nicoya).

*Thamnophilus doliatus pacificus* RIDGWAY, Proc. Biol. Soc. Wash., XXI, 1908, 193 (type from Chinandega, Nicaragua; coll. U. S. Nat. Mus. [Hicks]; Pacific slope from Chiapas, Mexico, to western Panama).

U. S. Nat. Museum: Bebedéro (Underwood), Pózo Azul de Pirrís (Zeledón), Coyolar (Alfaro).

Bangs Collection: Buenos Aires and El General de Térraba, Bolson, Coralillo (Underwood).

Carnegie Museum: Bebedéro, Miravalles, Bagáces, Boruca, and Buenos Aires (Carriker), Puriscal (Underwood). Seventeen skins.

The west coast Central American form of *T. doliatus* is found in Costa Rica over the whole of the Pacific lowlands and lower slopes, occasionally straggling up as high as San José (3,500 feet). It is most abundant in Guanacaste and in the Térraba Valley, the conditions present in those two regions being more suited to the habits of the birds. They are not forest inhabitants, but keep in the thickets and open scrubby woodland, especially along the borders of the "sabanas." I found them very abundant around Buenos Aires in



the low second-growth scrub in the river valley below the village. They are tame and rather stupid, like all of the genus, and easily approached.

339. *Thamnistes anabatinus saturatus* Ridgway.

*Thamnistes anabatinus* SCLATER and SALVIN, P. Z. S., 1860, 299 (Choctum, Guatemala). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (Angostura [J. Carmiol], Tucurríqui [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Angostura, Pacuare, and Naránjo de Cartago). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 216 (Angostura [Carmiol], Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 205 (Costa Rican references).

*Thamnistes anabatinus saturatus* RIDGWAY, Proc. Biol. Soc. Wash., XXI, 1908, 193 (Bonilla, Costa Rica [Ridgway]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Pózo del Pital (Cherrie), Jiménez (Verrill).

Bangs Collection: La Vijagua and Carrillo (Underwood).

C. H. Lankester Collection: Tuís.

Fleming Collection: Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Guácimo, Guápiles, La Hondura, Carrillo, El Hogar, El Pózo de Terraba (Carriker); Cariblanco de Sarapiquí (Underwood). Ten skins.

Mr. Ridgway has recently separated the southern birds from those of Guatemala and southern Mexico (the type locality) on the ground that they are darker, have the wings browner, and are on the whole much less ochraceous. The large series of Costa Rican specimens which I have examined bears out these differences, and it seems to be a well-marked race.

The species is found fairly commonly (as ant-thrushes go) over the northern half of the Caribbean watershed from an altitude of about 800 feet up to 3,000 or 4,000 feet. It is also very sparingly found in the southwestern Pacific lowlands, there being one record from Pózo Azul de Pirrís, one from Rio Naránjo (Pózo del Pital) and one from El Pózo de Terraba. I did not find the bird in southeastern Costa Rica, nor are there any records from that region. It is found in the thicker parts of the forest, especially where there are few large trees and much undergrowth and vines. They are arboreal in their habits, but do not go high up in the trees.

340. *Dysithamnus mentalis septentrionalis* Ridgway.

*Dysithamnus semicinereus* SCLATER, P. Z. S., 1855, 90 (Bogotá, Colombia); Cat. Birds Brit. Mus., XV, 1890, 221, *part* (Guaitíl [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (Turrialba, Dota, Grecia [F. Carmiol], Guaitíl [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — BOUCARD, P. Z. S., 1878, 60 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Cartago, Turrialba and Dota). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 206 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 41 (near headwaters of Rio Platinar, near Buenos Aires de Térraba; one specimen).

*Dysithamnus mentalis septentrionalis* RIDGWAY, Proc. Biol. Soc. Wash., XXI, 1908, 193 (type from Vera Paz, Guatemala; Panama to Guatemala).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Naránjo de Cartago (Cooper), Buena Vista (Castro and Fernandez), La Lagunaria de Dota (Basulto).

Bangs Collection: El General, large series; Cariblanco de Sarapiquí (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Juan Viñas and Las Mesas (Carriker). Three skins.

This ant-thrush is found only in the higher portions of the Caribbean slope, from 2,000 to 4,000 feet, and in the foothills of the southwestern portion of the Pacific slope. It seems to be a common bird about El General de Térraba, Underwood getting a large series of specimens at that place. It is perhaps most abundant on the Caribbean slope in the region of Juan Viñas, where different collectors have taken it. Cherrie records one specimen from near Buenos Aires, but I saw none there. This bird is found in the heavy forest, rather low down amongst the undergrowth and low trees, is sluggish in its habits and quite tame. It has a weak, rather pleasing note, similiar to that of *D. striaticeps*.

341. *Dysithamnus striaticeps* Lawrence.

*Dysithamnus striaticeps* LAWRENCE, Ann. Lyc. N. Y., VIII, 1865, 130 (Angostura [J. Carmiol]); IX, 1868, 107 (do.). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — BOUCARD, P. Z. S., 1878, 60 (San Carlos). — ZELEDÓN, An. Mus. de C. R., I, 1887, 115 (Angostura). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 223 (Valsa, Costa Rica [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 208 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 440 (Miravalles, very rare).

U. S. Nat. Museum: Reventazón (Carranza).

Bangs Collection: La Vijagua (Underwood).

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford),  
Rio Sicsola, Carrillo, El Hogar (Carriker). Thirteen skins.

This *Dysithamnus* is confined entirely to the Caribbean foothills, is rarely seen below 800 feet and is most abundant at about 1,000 to 1,500 feet, especially in northeastern Costa Rica, where (at La Vijagua) Underwood took a series of fifty-one specimens. I found it common in the foot-hills south of the railroad from Guácimo to Carrillo. It is found in the heavy forest, low down among the dense undergrowth and low trees, although it is not infrequently seen in more open spots. The birds usually go about in small bands of from five to ten and are very tame and unsuspecting.

I took the nest of this species near Jiménez, May 12, 1905, containing two badly incubated eggs. The nest is of the vireo type, constructed almost wholly of the black fibers from the stem of a woodland fern, much resembling black horse-hair, and covered over on the outside with green moss, which trailed down from the bottom for several inches. It was suspended from a horizontal fork of a small tree near the edge of the forest, about five feet from the ground. The female was incubating, and did not leave the nest until nearly touched. The eggs are creamy-white, with a few large lilac shell-markings and speckled, dotted, and blotched more or less over the whole surface with purplish-chestnut, heavier about the larger end. Measurements:  $21 \times 15$  and  $20.5 \times 15.5$  mm.

### 342. *Myrmotherula fulviventris* Lawrence.

*Myrmotherula fulviventris* LAWRENCE, Ann. Lyc. N. Y., VII, 1862, 468 (Panama); IX, 1868, 108 (Angostura [J. Carmiol]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Pacuare and Jiménez). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 234 (Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 210 (Costa Rican references; Honduras to Ecuador).

U. S. Nat. Museum: Jiménez (Alfaro), Rio Matina (Cherrie),  
Reventazón (Carranza).

Bangs Collection: La Vijagua and Carrillo (Underwood).

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford);  
Cuábre, Carrillo, El Hogar (Carriker). Fourteen skins.

Very little has been recorded concerning this little ant-thrush, and not many specimens of it are in collections from Costa Rica. It is confined to the Caribbean lowlands, from sea-level up to not more than 1,500 feet. It is most abundant at about 600 to 800 feet, that is

just below the last of the foothills, where the land is quite level and the forest heavy. Although arboreal in their habits they keep very close to the ground, in the low bushes and among the roots of the palms, etc., where they are continually hopping and clambering about. They have a low sweet chirp, which is frequently uttered when the birds are disturbed. They are almost invariably seen in small flocks, and usually in company with other small ant-thrushes and occasionally wrens.

I took a single nest of this species near Jiménez, May 9, 1905, containing two partly incubated eggs. It was a cup-shaped structure, of the vireo type, and hung in the crotch of a small bush, in the thick forest about three feet from the ground. It was constructed almost entirely of black and brown rootlets, lined with the same, and measured about three and one half inches outside diameter, and two inches in inside depth and diameter. The eggs are purplish cream-colored, blotched, streaked, and scratched with purplish-chestnut. Measurements:  $20.3 \times 14.8$  and  $22.5 \times 15.5$  mm.

### 343. *Myrmotherula melæna* (Sclater).

*Formicivora melæna* SCLATER, P. Z. S., 1857, 130 (Bogotá, Colombia).

*Myrmotherula melæna* SCLATER, P. Z. S., 1858, 237 (Bogotá). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 108 (Angostura and Pacuare [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — BOUCARD, P. Z. S., 1878, 61 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Pacuare, Naránjo de Cartago, Las Trojas, Barránca). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 239 (Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 211 (Costa Rica to Peru and Upper Amazon Valley; Costa Rican references). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 501 (Rio Frio).

*Myrmotherula albigula* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 131 (Angostura [Carmiol]; ♀ of *M. melæna*); IX, 1868, 108 (do.).

*Myrmotherula axillaris* CARRIKER, Ann. Carnegie Mus., V, 1908, 8 (Rio Sicsola, Costa Rica).

U. S. Nat. Museum: Reventazón (Carranza), Jiménez (Alfaro and Cherrie).

Bangs Collection: La Vijagua, Carrillo, and La Junta (Underwood).  
Carnegie Museum: Guápiles (Carriker & Crawford); Rio Sicsola, El Hogar (Carriker). Fourteen skins.

This handsome little species is confined to the Caribbean lowlands and lower slopes, from sea-level up to not more than 1,500 feet. Zeledón records it from two points on the Pacific slope (Las Trojas and Barránca; An. Mus. Nac. de C. R., I., 1887, 115), but no other

collectors have ever taken it in that region, nor are there other records from the Pacific side. I am inclined to doubt the correctness of Zeledón's record, and think that it is confined strictly to the Caribbean side, at least in Costa Rica.

It seems that a few immature males of this species have a slate-gray phase, resembling very much specimens of *M. axillaris* of South America. I recorded two such birds as *M. axillaris* (see synonymy above), and find three specimens of the same kind in a large series from La Vijagua. My birds were taken on the Sicsola river.

This species is strictly arboreal in its habits and is not usually seen near the ground. They go about in small bands in company with *Formicivora boucardi* and other small woodland birds. They are rather noisy, constantly twittering and chirping after the manner of *Formicivora*.

344. ***Myrmotherula ménétriési schisticolor*** (Lawrence).

*Myrmothera menetriesi* D'ORBIGNY, Voy. Am. Mer., Ois., 184 (Bolivia).

*Myrmotherula menetriesi* SCLATER, P. Z. S., 1858, 237. — BOUCARD, P. Z. S., 1878, 61 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., XV, 1890, 240 (Pózo Azul de Pirris and Barranca). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 240, *part* (Dota Mts. [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 211, *part* (Guatemala to Bolivia; Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 41 (Lagarto, Boruca, and Térraba). — BANGS, Auk, XXIV, 1907, 296 (Boruca and El Pózo de Térraba [Underwood]).

*Myrmotherula modesta* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 108 (Grecia [F. Carmioli]; ♀ of *M. menetriesi schisticolor*).

*Formicivora schisticolor* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 172 (Turrialba [F. Carmioli]); IX, 1868, 108 (Turrialba and Barranca [F. Carmioli]).

*Myrmotherula menetriesi schisticolor* RIDGWAY MS., April, 1909.

U. S. Nat. Museum: Naránjo de Cartago (Cooper), Pózo del Pital (Cherrie), Pózo Azul de Pirris (Zeledón), La Lagunaria de Dota (Basulto).

Bangs Collection: La Vijagua, El General de Térraba, and Tenorio (Underwood).

Fleming Collection: Carrillo and Pózo Azul de Pirris (Underwood).

Carnegie Museum: Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Pózo Azul de Pirris, Carrillo, Boruca (Carriker). Eight skins.

Since the type of *M. ménétriési* d'Orbigny comes from Bolivia, it is rather to be expected that Central American birds should be at least

subspecifically distinct. Lawrence described the Costa Rican bird as *Formicivora schisticolor* in 1867, but his name has been universally placed under the synonymy of *M. ménétrièsi*. Mr. Ridgway, having compared Costa Rican birds with those from South America has found them to be different, and has set up Lawrence's name for the Central American bird.

This species has a wide range in Costa Rica, covering the whole of the Caribbean slope between about 1,000 and 3,000 feet, as well as the foothills and lowlands of the Pacific, where it is most abundant in the southwestern portion of the country, especially in the Térraba Valley. The habits of this species are very like those of the preceding, except that it is more inclined to be solitary, not going about in bands so much as does *M. melana*.

### 345. *Formicivora boucardi virgata* (Lawrence).

*Formicivora boucardi* SCLATER, P. Z. S., 1858, 300 (Acatepec, Mexico); Cat. Birds Brit. Mus., XV, 1890, 254 (Péje and Angostura [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 108 (Angostura, "San José," and Pacuare [J. Carmioli]). — BOUCARD, P. Z. S., 1878, 61 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Pózo Azul de Pirris, Pacuare, Jiménez, La Valsa). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 43 (Palmar, Lagarto, Boruca, Buenos Aires). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 216 (Mexico to Panama; Costa Rican references). — BANGS, Auk, XXIV, 1907, 296 (Boruca, Paso Real, El Pózo, and Lagarto de Térraba [Underwood]).

*Formicivora virgata* LAWRENCE, Ibis, 1863, 182 (Panama).

*Formicivora boucardi virgata* RIDGWAY MS., April, 1909.

U. S. Nat. Museum: La Concepcion de Jiménez and Talamanca (Cherrie), Pózo Azul de Pirris (Zeledón), Jiménez (Alfaro and Carranza).

Bangs Collection: El General and Buenos Aires de Térraba, Pózo Azul de Pirris, La Vijagua (Underwood).

Fleming Collection: Carrillo (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirris, Rio Sicsola, El Hogar, El Pózo de Térraba (Carriker). Ten skins.

Upon a comparison of Costa Rican specimens with birds from British Honduras, the difference is very apparent, the southern specimens being distinguished by having the pileum, nape, and scapulars black (in *boucardi* ashy), while the ashy abdomen and breast of the northern birds is almost wanting, the entire under parts being black. *F. b. virgata* is also smaller.

This species ranges over the whole of the Caribbean lowlands and up the slopes to about 2,000 feet, and on the Pacific lowlands from the Gulf of Nicoya southward, but not to so high an altitude as on the eastern side. In habits it is very similar to *Myrmotherula melana*, inhabiting the heavy forest, and going about in small bands in company with other small woodland birds. The note is a weak chirp, not unpleasant to the ear. It is probably the most abundant of the arboreal ant-thrushes in Costa Rica.

Mr. Cherrie gives the following note on the habits of the male at the beginning of the breeding-season (Expl. Zool. en C. R., 1890-1, 1893, 43): "The time of nesting begins in February. The enamoured male executes a kind of dance before the female, making turns from one side to the other, with the wings dragging, the tail lifted and spread and the feathers of the back raised and parted in the center, disclosing clearly the white patch ordinarily concealed." (*Translated from the Spanish.*)

346. **Rhamphocænus rufiventris** (Bonaparte).

*Scolopacinus rufiventris* BONAPARTE, P. Z. S., 1837, 119 (Guatemala [Velazquez]).  
*Rhamphocænus rufiventris* GRAY, Gen. Birds, I, 157, pl. 47, fig. 2. — SALVIN, Ibis, 1869, 319 (Bebedéro [Arcé]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 261 (Bebedéro [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 219 (Mexico to Colombia; Costa Rican references). — UNDERWOOD, Ibis, 1896, 440 (Miravalles). — BANGS, Auk, XXIV, 1907, 296 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: La Lagunaria de Dota (Basulto).

Acad. Nat. Sci. Philadelphia: Bebedéro (Underwood).

Bangs Collection: El General de Térraba, Pózo Azul de Pirrís, Bolson, Tenorio, La Vijagua (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford): Pózo Azul de Pirrís, Cuábres, Guácimo, Bebedéro, Miravalles, Carrillo, El Hogar, El Pózo de Térraba, Boruca (Carriker). Sixteen skins.

Although this species has a very large range and covers nearly the whole of Costa Rica below 1,500 feet, it is not common, and very few specimens seem to have been taken by early collectors. Lawrence did not have a specimen of it when he issued his Catalogue in 1868, although Arcé had taken it at Bebedéro previous to that time. Up to 1887 there was no Costa Rican specimen in the Museo Nacional de Costa Rica.

It seems to be just as abundant on the Pacific as on the Caribbean

lowlands, but few are ever seen in any locality. The birds are fond of frequenting tangled jungle, where there are many vines, among which they hop about searching for food. Nutting says that they have the habits of the nuthatches, but I have never seen them climbing. Apparently they do not associate much with other birds, going about in pairs only, and keeping close together. Like most small arboreal species they are quite tame and easily approached. I have never heard them utter any kind of a call.

347. *Rhamphocænus semitorquatus* Lawrence.

*Rhamphocænus semitorquatus* LAWRENCE, Ann. Lyc. N. Y., VII, 1862, 469 (Panama [M' Leannan]); IX, 1868, 108 (Valsa [J. Carmiol]). — BOUCARD, P. Z. S., 1878, 61 (San Carlos, very rare). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Rio Súcio). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 262 (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 219 (Costa Rica to Colombia; Costa Rican references).

U. S. Nat. Museum : San Carlos and Jiménez (Alfaro) (Cherrie).

Bangs Collection : La Vijagua and Carrillo (Underwood).

Fleming Collection : Carrillo and Cariblanco de Sarapiquí (Underwood).

Carnegie Museum : Guápiles and Guácimo (Carriker & Crawford) ; Cuábre, Carrillo, El Hogar (Carriker). Fourteen skins.

This *Rhamphocænus* is restricted entirely to the Caribbean lowlands between sea-level and 1,500 feet. It is not abundant anywhere, but is perhaps more numerous in the upper part of the Santa Clara Valley and thence northwestward along the base of the foothills to Lake Nicaragua. I have seen it only in the heavy dark forest, where it keeps near the ground among the low bushes and roots of the trees, being usually seen in company with *Myrmotherula fulviventris*, *Myrmelastes exsul* and *Leucolepis lawrencei*. It is also inclined to be rather noisy when disturbed, chirping for a few moments and then skulking off among the undergrowth.

348. *Cercomacra tyrannina crepera* (Bangs).

*Pyriglena tyrannina* SCLATER, P. Z. S., 1855, 90, 147, pl. 98 (Sante Fé de Bogota, Colombia).

*Cercomacra tyrannina* SCLATER, P. Z. S., 1858, 245 (Bogotá, Colombia); Cat. Birds Brit. Mus., XV, 1890, 265, *part* (Tucurríqui [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 109 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — BOUCARD, P. Z. S., 1878, 61 (San



Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Pacuare, Pózo Azul de Pirrís and Jiménez). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 214, *part* (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 42 (Lagarto, Boruca, Térraba, and Buenos Aires). — UNDERWOOD, Ibis, 1896, 440 (Miravalles).

*Cercomacra crepera* BANGS, Auk, XVIII, 1901, 365 (Divala, Chiriquí, Panama).

*Cercomacra tyrannina crepera* BANGS, Auk, XXIV, 1907, 296 (Boruca, El Pózo, Paso Real, and Barránca de Térraba [Underwood]). — CARRIKER, Ann. Carnegie Museum, V, i, 1908, 8 (Bebedéro, Pózo Azul de Pirrís, El Pózo de Térraba, Boruca, and Buenos Aires; critical).

U. S. Nat. Museum: Talamanca (Cherrie), Jiménez (Alfaro), Pózo Azul de Pirrís (Underwood), Pígres (Ridgway and Zeledón).

Bangs Collection: Pózo Azul de Pirrís, Carrillo, Cerro de Santa Maria, Tenorio, La Vijagua El General de Térraba (Underwood).

C. H. Lankester Collection: Guácimo.

Fleming Collection: Pózo Azul de Pirrís, Carrillo, Miravalles (Underwood).

Carnegie Museum: (see references under *C. t. crepera*, Ann. Carnegie Museum, V, i, 1908, 8). Thirty-two skins.

Costa Rican specimens of this species vary a great deal in the intensity of the coloration, especially in the males, those from the Caribbean slope and from northwestern Costa Rica being much darker than those from the southwestern region. In fact some of the birds from Térraba are almost as pale as some of the Colombian specimens of true *C. tyrannina*. I should call the Caribbean birds typical of *C. t. crepera* (although the bird was described from the Pacific side of Chiriquí), and those from the Térraba district more or less intermediate between *C. t. tyrannina* and *C. t. crepera*, but nearer to the latter, making all Costa Rican specimens referable to the dark race.

This is the most abundant of all the *Formicariidæ* in Costa Rica, being found over the whole of the Caribbean lowlands up to about 1,500 feet and the Pacific lowlands up to 2,000 feet. They are rarely seen in the heavy dark forest, but inhabit the more open woodland where the undergrowth is very dense, and patches of wild cane along the river banks. They are always seen in pairs, are very tame, and are always appearing in most unexpected places; thereby making themselves a great nuisance to the collector, who frequently mistakes them for something else, until after he has shot them.

349. **Gymnopithys bicolor olivascens** (Ridgway).

*Pithys bicolor* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 109 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 306 (Costa Rica). — BOUCARD, P. Z. S., 1878, 62 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Navárrro de Cartago). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 296 (Valsa [Carmiol]).

*Pithys bicolor olivascens* RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 460 (Santa Ana, Honduras).

*Gymnopithys olivascens* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 222 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 42 (Boruca).

*Gymnopithys bicolor olivascens* BANGS, Auk, XXIV, 1907, 296 (Boruca and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Jiménez and San Carlos (Alfaro).

Bangs Collection: El General de Térraba, La Vijagua and Pózo Azúl de Pirrís (Underwood).

C. H. Lankester Collection: La Florida.

Fleming Collection: Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Cuábre, Guácimo, Rio Sicsola, El Hogar, Paso Real de Térraba (Carriker). Ten skins.

Birds from the Pacific slope are slightly paler than Caribbean birds, especially on the flanks and abdomen, being less ruddy-brown. The difference is, however, too slight to be of importance. This species has a wide range in Costa Rica, covering the whole of the Caribbean and Pacific lowlands (except in Guanacaste) up to about 2,000 feet. It is exclusively an inhabitant of the heavy forest, is both terrestrial and arboreal, and is very fond of feeding on the common migratory ant of that country, when it is usually to be seen in company with *Myrmeciza*, *Phænostictus*, and *Formicarius*, as well as several species of Dendrocolaptine birds. As a rule it is rather shy, skulking off quietly when disturbed. I have almost always seen it in small flocks of from four to eight. It would seem that the conspicuously white throat and breast would cause the birds to be easily seen, but it is just the contrary, giving the same result as white underparts in a mammal and rendering them much less conspicuous than any of the other species having the same habits.

350. **Myrmeciza exsul** Sclater.

*Myrmeciza exsul* SCLATER, P. Z. S., 1858, 540 (Panama [Delattre]).

*Myrmeciza immaculata* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 109 (Pacuare

and Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — BOUCARD, P. Z. S., 1878, 61, *part* (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115, *part* (Pacuare, Jiménez). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 279, *part* (Valsa [Carmiol]). — CHERRIE, Auk, VIII, 1891, 193 (Pacuare [Cooper], Jiménez [Cherrie & Alfaro], Carrillo [Underwood]).

*Myrmeciza intermedia* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 340 (Sipurio de Talamanca [Zeledón]).

*Myrmelastes intermedius* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 227 (Nicaragua to Panama; Costa Rican references). — CARRIKER, Ann. Carnegie Mus., V, i, 1908, 10, in text (crit.).

*Myrmelastes exsul* HELLMAYR, Nov. Zool., XII, 1906, 340 (critical).

U. S. Nat. Museum: Reventazón (Carranza), Jiménez (Alfaro).

Bangs Collection: La Vijagua and Carrillo (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford), Cuábres, Guácimo, Rio Sicsola, El Hogar (Carriker). Seventeen skins.

Mr. Hellmayr (Nov. Zool., XII, 1906, 340) has proven conclusively that the type of *Myrmeciza exsul* Sclater came from Panama, and that the Central American bird of the Caribbean lowlands must be known as *M. exsul*. I am still undecided as to whether Costa Rican birds differ from typical *M. exsul* of Panama, not having had sufficient material to settle that question in my own mind. However, the evidence at hand seems to indicate that they are the same, and I have thus indicated it by the name here given to the Costa Rican bird. The name of *Myrmeciza immaculata* Sclater and Salvin, given to Panaman specimens of this species, was given under the erroneous impression that the type of *Myrmeciza exsul* Sclater came from Ecuador and not Panama.

Mr. Ridgway states (Proc. Biol. Soc. Wash., XXII, 1909, 74, footnote) that he is unable to find characters justifying the recognition of a genus *Myrmelastes* as distinguished from *Myrmeciza*, with which opinion I quite agree, placing all species of the *Myrmeciza* type under that genus.

In Costa Rica *M. exsul* is found only on the Caribbean lowlands and lower slopes, from sea-level up to about 2,000 feet, but is not common above 1,000 feet. It is found only in the heavy dark forests, and is almost entirely terrestrial in its habits, only occasionally hopping about on the elevated roots and in the low bushes. It is very

fond of feeding on the swarms of travelling ants so commonly met with in the lowlands. It has two different notes which are uttered on different occasions. The ordinary alarm note is heard only when the bird is disturbed, and is rapidly repeated and rather harsh. The call note is given by the male only, and is not often heard except during the breeding season. It consists of from two to five clear whistling notes of two different pitches, the first higher than the rest. Sometimes but one note of the lower pitch will be given and again from two to four, but all of the same tone. This call note is very similar to that of both *Formicarius* and *Hylopezus*, but with practice they can all be readily distinguished.

I took the nest of this species at Guápiles, July 13, 1905, containing two fresh eggs. The nest was made of leaves, weed-stalks, and roots, lined with fine brown weed-fiber, and placed in a cluster of ferns in the thick jungle, about a foot above the earth. The eggs are whitish, but suffused over nearly the whole surface with reddish-purple, and speckled, scrawled, and blotched with deep purplish-chestnut and lilac, gathered about the larger end in the form of a cap. Measurements:  $22 \times 17.5$  and  $22.5 \times 17$  mm.

### 351. *Myrmeciza occidentalis* (Cherrie).

*Myrmeciza immaculata* BOUCARD, P. Z. S., 1878, 61, *part* (San Mateo, Costa Rica). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 398 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115, *part* (Las Trojas and Pózo Azul de Pirrís). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 279, *part*.

*Myrmeciza immaculata occidentalis* CHERRIE, Auk, VIII, 1891, 191 (type from Pózo Azul de Pirrís [Zeledón]; also Las Trojas [Alfaro] and Bebedéro [Underwood]).

*Myrmelastes occidentalis* CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 43 (Palmar, Boruca, Lagarto, and Buenos Aires). — CARRIKER, Ann. Carnegie Mus., V, 1, 1908, 10 (critical).

*Myrmelastes exsul occidentalis* HELLMAYR, Nov. Zool., XII, 1906, 340 (critical). — BANGS, Auk, XXIV, 1907, 296 (Boruca, Paso Real, El Pozó, and Barranca de Térraba [Underwood]).

U. S. Nat. Museum: Pózo del Pital (Cherrie), Pózo Azul de Pirrís (Underwood).

Bangs Collection: Buenos Aires and El General de Térraba; Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, Esparta, El Pózo de Térraba, Boruca, Buenos Aires (Carriker). Twenty skins.

Mr. Hellmayr, in recent critical remarks on this species, considers it

as only subspecifically distinct from *M. exsul*, but upon comparing a large series of the two forms, the differences become so apparent and constant, without signs of intergradation, that I believe it entitled to specific rank.

This form is confined to the Pacific lowlands and lower foothills of the southwestern portion of Costa Rica (Gulf of Nicoya southward) and Chiriquí. Its habits are essentially the same as those of *M. exsul* of the eastern side.

A single nest of this bird was found at Pózo Azul de Pirrís, May 10, 1902, containing two partly incubated eggs. Both nest and eggs are very similar to those of *M. exsul*, except that the nest of this bird was a little rougher, containing more twigs and roots, and was lined with fine black roots. It was also placed near the ground in the thick forest. The eggs are of about the same color, only a little paler, nearly the whole surface being obscured with specks, blotches, and scrawls of purplish-chestnut. Measurements:  $23 \times 17$  and  $24 \times 17$  mm.

### 352. *Myrmeciza læmosticta* Salvin.

*Myrmeciza læmosticta* SALVIN, P. Z. S., 1864, 382 (Tucurríqui [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 109 (Tucurríqui [Arcé]; coll. O. Salvin). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 280 (Costa Rica and Veragua). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 230 (Costa Rican references). — HELLMAYR, Nov. Zool., XIII, 1906, 342 (crit.).

*Drymophila læmosticta* CARRIKER, Ann. Carnegie Mus. V, i, 1908, 9 (crit.).

*Myrmeciza stictoptera* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 132 (Angostura, Costa Rica [Carmioli]) IX, 1868, 109 (Angostura [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 230 (Costa Rican references). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 532 (San Carlos [Alfaro]). — HELLMAYR, Nov. Zool., XIII, 1906, 342 (crit.).

*Drymophila stictoptera* CARRIKER, Ann. Carnegie Museum, V, i, 1908, 9 (crit.).

U. S. Nat. Museum: San Carlos, two specimens (Alfaro).

Bangs Collection: Carrillo and La Vijagua (Underwood). Ten specimens.

C. H. Lankester Collection: La Florida.

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker and Crawford), Cuábres, Carrillo, Peralta (Carriker). Six specimens.

Mr. Hellmayr was the first one to publish anything in regard to the real status of the Costa Rican species of *Myrmeciza* (*læmosticta* and

*stictoptera*), giving very good proof of the fact that these two so-called species were merely male and female of one form (*laemosticta*). I had discovered the same thing some time previously, and in 1908 published a note on the same thing without having seen Mr. Hellmayr's paper. There can be no question but that the birds are the same. I have taken then both together and the sexing of all the skins which I have seen gives further proof, if any were needed.

This species in Costa Rica is confined to the foothills of the Caribbean slope, between an altitude of 1,000 and 2,500 feet, inhabiting the heavy, dark, humid forests found everywhere in that region. I usually found it along the sides of some dark, damp ravine, on the ground or in the low bushes. It is not a common bird at all, and very few have been taken by collectors.

### 353. *Myrmeciza immaculata* (Lafresnaye).

*Thamnophilus immaculatus* LAFRESNAYE, Rev. Zool., 1845, 340 (Colombia). — SALVIN, Ibis, 1870, 114 (Tucurríqui, Costa Rica [Arcé]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 189 (Tucurríqui [Arcé]).

*Myrmelastes immaculatus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 225 (Costa Rican references).

*Myrmeciza zeledoni* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 74 (Guayábo, Costa Rica; U. S. Nat. Mus. Coll.).

U. S. Nat. Museum: Guayábo, March, 1908 (Ridgway and Zeledón); ♂ and ♀.

Bangs Collection: Cariblanco de Sarapiquí, ♂ and ♀; La Hondura, ♀ (Underwood).

Fleming Collection: Cariblanco de Sarapiquí (Underwood); one specimen.

Carnegie Museum: La Hondura (Carriker), three ♀'s; Cariblanco de Sarapiquí, (Underwood) one ♂.

In a collection of birds recently received from western Colombia by Mr. Bangs, are six skins of *Myrmeciza immaculata* (Lafresnaye), four females and two males. After the closest comparison with three females and one male of the same species from Costa Rica, I cannot find a single character upon which Mr. Ridgway based his *M. zeledoni*, which will hold good. The birds are almost exactly alike in coloration, with the exception that the Costa Rican females are a very little richer brown on the throat and breast, but it is so small a difference that in some specimens it can scarcely be detected. The black on

the chin, malar, suborbital and auricular regions is exactly the same, while the blacker tail of the Costa Rican bird as given by Mr. Ridgway is in some cases reversed. As for the measurements, the following list will show that they are so variable in birds from the same region, that they are of no value whatever.

## COSTA RICAN SPECIMENS.

<i>Males.</i>			<i>Females.</i>		
Wing.	Tail.	Bill.	Wing.	Tail.	Bill.
78	85	23 mm.	75	80	22 mm.
			79	74	23 "
			78	80	23 "

## COLOMBIAN SPECIMENS.

<i>Males.</i>			<i>Females.</i>		
Wing.	Tail.	Bill.	Wing.	Tail.	Bill.
80	80	25 mm.	78	75	25 mm.
77	82	23 "	81	82	23 "
			82	70	22 "
			77	84	25 "

The Costa Rican range of this species covers the Caribbean slope from about 1,000 up to 4,000 feet, but it is a very rare bird, few specimens having ever been taken. It inhabits the dense, humid jungle of the above mentioned region and is quite similar in its habits to *M. læmosticta*.

354. *Hylophylax navioides* (Lafresnaye).

*Conopophaga navioides* LAFRESNAYE, Rev. Zool., 1847, 69 (Pasto, Cauca Valley, Colombia).

*Hypocnemis navioides* SCLATER, P. Z. S., 1858, 254 (Ecuador). — LAWRENCE, Ann. Lyc. N. Y., IX, 109 (Angostura [J. Carmiol]; Turrialba [F. Carmiol]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Jiménez, Pacuare, and Angostura). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 293 (Tucurríqui [Arcé], Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 231 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 440 (Miravalles).

*Hypocnemis navioides capnitis* BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 107 (Miravalles, Costa Rica [Underwood]).

*Hylophylax* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 70 (type *Conopophaga navioides* Lafresnaye).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón); Jiménez (Verrill) (Alfaro) (Cherrie); Reventazón (Carranza); San Carlos (Alfaro).

Bangs Collection: Carrillo, La Vijagua, Tenorio, and Cerro de Santa Maria (Underwood).

C. H. Lankester Collection: Miravalles, La Florida, Guácimo.

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford); Guácimo, Cuábre, Rio Sicsola, Guápiles, Carrillo, Miravalles, Bagáces (Carriker). Twenty-two skins.

Mr. Bangs has separated the birds of this species from Costa Rica and Chiriquí from those from Panama and southward, but after a careful examination of a large series I have concluded that the differences are altogether too slight to justify such a separation. Costa Rican birds have the back darker and richer chestnut and the black spotting on the breast a trifle heavier, otherwise they are exactly the same as specimens from Panama.

This is a very common bird over the whole of the Caribbean lowlands from sea-level up to about 2,000 feet, and is the most abundant ant-thrush in northwestern Costa Rica, especially in the Guanacaste region. It is usually found in fairly heavy forest, and is almost entirely arboreal in its habits, hopping and climbing about among the undergrowth, shrubbery, and low limbs of the trees. It is a very noisy little bird and usually goes about in small bands in company with some of the other arboreal ant-thrushes and tree-creepers (*Dendrocolaptidae*.)

I found a nest of this species at Guácimo in April, 1903, containing two young birds. It was a roughly built structure of leaves, rootlets, and weed-fiber, of the ordinary shape (like *Myrmeciza exsul*) and placed in a low bush in the heavy forest, just beside a path.

### 355. *Gymnocichla nudiceps erratilis* Bangs.

*Myiothera nudiceps* CASSIN, Proc. Acad. Nat. Sci. Phila., V, 1850, 106, pl. 6 (Panama [J. G. Bell; coll. Phil. Acad. Sci.]).

*Gymnocichla nudiceps* SCLATER, P. Z. S., 274; Cat. Birds Brit. Mus., XV, 1890, 272, *part* (no C. R. record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 223, *part* (no C. R. record). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 42 (Boruca, Térraba, and Buenos Aires; first record for Costa Rica).

*Gymnocichla nudiceps erratilis* BANGS, Auk, XXIV, 1907, 297 (cotypes from Boruca [Underwood]; other specimens from El Pózo de Térraba).

U. S. Nat. Museum: Pígres (Ridgway and Zeledón).

Bangs Collection: El General and Buenos Aires de Térraba (Underwood).

Carnegie Museum: Boruca and Paso Real (Carriker). Four skins.

The type of *G. nudiceps* is from Panama, where the birds (espe-



cially the females) differ very distinctly from Costa Rican specimens, the latter being very dark ferruginous below in contrast to the orange-rufous color of the bird from Panamá. In Costa Rica this form is confined to the southwestern Pacific lowland region, from near sea-level up to about 1,800 feet. It has been taken as far north as Pígres, on the Gulf of Nicoya, where Mr. Ridgway secured one or more specimens. This bird is not found in the open forest, but in the dense, tangled jungle. It is usually seen in pairs, and feeds in company with *Myrmelastes* and *Formicarius* on the travelling ants.

### 356. *Gymnocichla cheiroleuca* Sclater and Salvin.

*Gymnocichla nudiceps* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 109 (Tucurríqui [Arcé], Coll. O. Salvin).

*Gymnocichla cheiroleuca* SCLATER and SALVIN, P. Z. S., 1869, 417 (Omoa, Honduras [Leyland]; Tucurríqui, Costa Rica [Arcé]). — SALVIN, Ibis, 1869, 314 (Tucurríqui). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 272 (Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 224 (Costa Rican references).

U. S. Nat. Museum: Jiménez (Alfaro).

Bangs Collection: Talamanca, one ♂ (Cooper?).

Carnegie Museum: Cuábre, Rio Sicsola, Guápiles, El Hogar (Carriker). Twelve skins.

This ant-thrush, although not an extremely rare bird, is very rare in collections. Its habitat is such that it has been overlooked by most collectors, being found only in the most impenetrable jungle in the Caribbean lowlands, from sea-level up to about 1,000 feet. It is also a very shy bird and its habits must be carefully studied before the bird can be secured, except an occasional specimen now and then. The females are very much more difficult to secure than the males, always slipping away at the first alarm. The birds are very fond of the dense jungles of wild plantain so abundant in some parts of the Santa Clara Valley, where they are usually found in company with *Phænostictus macleannani saturatus*, hopping about on or near the ground. When alarmed they will sometimes fly up into a low palm tree or vine-covered shrub. They have no call which I have ever heard, but do have an alarm note, uttered only by the male when suddenly disturbed, the female being always silent. I was unable to learn anything about their breeding habits or nesting.

357. *Phænostictus macleannani saturatus* (Richmond).

*Phlegopsis macleannani* LAWRENCE, Ann. Lyc. N. Y., VII, 1860, 285 (Panama [M'Leannan]); IX, 1868, 109 (Angostura [J. Carmiol]). — SCLATER and SALVIN, Exotic Orn., 1867, 17 (Tucurríqui). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 415 (Rio Súcio [J. Cooper]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Rio Súcio). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 300 (Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 236 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 441 (Miravalles).

*Phlegopsis saturata* RICHMOND, Proc. U. S. Nat. Mus., XVIII, 1895, 625 (Rio Escondido, Nicaragua, Aug. 31, 1892 [C. W. Richmond]).

*Phænostictus* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 70 (type, *Phlegopsis macleannani* Lawrence).

U. S. Nat. Museum: Rio Súcio (Cooper), Reventazón (Carranza).

Bangs Collection: Cariblanco de Sarapiquí, La Vijagua, Tenorio, Cerro de Santa Maria (Underwood). Thirteen specimens.

C. H. Lankester Collection: El Hogar.

Carnegie Museum: Guápiles, El Hogar (Carriker). Five specimens.

I fail to find the very noticeable difference between specimens of *Phænostictus macleannani* from Panama and Costa Rica, which were pointed out by Dr. Richmond in his description of *P. saturata* from Nicaragua. I was able to compare Costa Rican specimens with but two from Panama, but in these two skins the differences are very slight indeed. It is true that the northern birds are slightly different, but the best that can be said of them is that they are a rather poor subspecies of the Panaman form.

This species in Costa Rica is confined to the Caribbean foothills and higher portion of the lowlands and the Pacific slope in the extreme northwestern portion of the country, probably only from the Volcan de Miravalles northward. I did not see the bird in Talamanca, but it doubtless occurs there. I found it commonest in the upper part of the Santa Clara Valley between about 600 and 1,500 feet, in the dark, damp portions of the forest. This species feeds on the migrating ants in company with other terrestrial birds, and does not appear to be so shy as *Gymnocichla*. It seldom leaves the ground, and has the curious habit of rapidly jumping up and down on the ground, like *Stenopsis* and *Nyctidromus*, when alarmed. The naked skin of the head is bright cobalt-blue in life.

358. *Formicarius nigricapillus* Cherrie.

*Formicarius analis* SALVIN, P. Z. S., 1866, 74, *part* (Costa Rica [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 *part* (reference to Salvin's record, *antea.*). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 304 (Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 235 (Costa Rican references).

*Formicarius nigricapillus* "Cherrie," RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 675 (Buena Vista, Costa Rica [Castro and Fernandez]).

Bangs Collection: Carrillo, Oct. 23, 1898; Cariblanco de Sarapiquí, Aug. 15, 1899; Cerro de Santa Maria, Jan. 5, 1908 (Underwood).  
Fleming Collection: Cariblanco de Sarapiquí (Underwood).

With the exception of *rufpectus*, this is the rarest of the genus *Formicarius* in Costa Rica. Up to 1893 all Costa Rican and Chiriquí specimens were referred to as *F. analis*, and there may be some confusion in the records, some specimens of *F. umbrosus* (then not described) probably being also referred to *analis*, since the ranges of the two birds overlap along the foot-hills of the Caribbean.

I was never able to secure specimens of this rare species, so know nothing about the bird in life. However, from what I have been able to learn I should say that the range of this species covers the foothill region of the Caribbean slope from about 1,200 up to 2,500 feet, and that it is undoubtedly found in the dark humid forests peculiar to the foot-hill region, like some other species of the *Formicariidæ*.

359. *Formicarius hoffmanni* (Cabanis).

*Myrmornis hoffmanni* CABANIS, Jour. für Orn., 1861, 95 (Costa Rica [Hoffmann]).

*Formicarius hoffmanni* SCLATER and SALVIN, P. Z. S., 1864, 357 (Panama). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (Costa Rica [Hoffmann]; Cabanis' record). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115, *part* (Las Trojas). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 304, *part* (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 234, *part* (Costa Rican references). — RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 680 (Buenos Aires de Térraba and Las Trojas).

*Formicarius hoffmanni hoffmanni* BANGS, Auk. XXIV, 1907, 298 (Boruca, Paso Real, El Pózo, Lagarto, and Barranca de Térraba [Underwood]).

Bangs Collection: El General and Buenos Aires de Térraba, Pózo Azul de Pirris (Underwood).

Carnegie Museum: Pózo Azul de Pirris, El Pózo de Térraba, and Boruca (Carriker). Thirteen skins.

There are four immature males of this species in Mr. Bangs' collection, three from the Térraba Valley and one from Divala, Chiriquí,

which exhibit a phase of plumage which I believe has not hitherto been described.

The entire plumage is darker than in mature birds, the pileum and upper parts being of a darker, richer brown; the portion of the throat which is black in adult birds, is white, each feather tipped with black, and in two specimens with submarginal spots of light brown; the whole chest is slaty-black, each feather edged with the color of the upper parts; the remainder of the lower parts about the same as in the adult.

This species is confined to the southwestern Pacific coast region, from the Rio Grande de Tárcos southward, and from sea-level up to about 1,500 feet. It is quite abundant in the Pirris Valley and very common in the lowlands of the Térraba region. It inhabits the heavy dark forest, is strictly terrestrial, and feeds a great deal upon the common foraging ants. The males have a very musical note, which is heard more or less the year round, but more commonly during the breeding season. It resembles very closely the same notes described under *Myrmelastes exsul*, except that it is louder and clearer, and never consists of less than four notes, often six or seven. The males (but never the female) are easily decoyed by imitating this note, coming close up to the person calling, if he remains perfectly still. The females are much shyer than the males and are very difficult to secure.

### 360. *Formicarius umbrosus* Ridgway.

*Formicarius hoffmanni* BOUCARD, P. Z. S., 1878, 62 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115, *part* (Jiménez and Pacuare). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 234, *part* (Costa Rican references).

*Formicarius umbrosus* RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 681 (Talamanca, Costa Rica [J. Cooper]; Jiménez [Verrill]). — UNDERWOOD, Ibis, 1896, 441 (Miravalles).

U. S. Nat. Museum: Rio Matina (Cherrie), Jiménez (Alfaro), Bonilla (Ridgway).

Bangs Collection: La Vijagua and Jiménez (Underwood).

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford); Guápiles, Cuábre, Rio Sicsola, Miravalles, and Bagáces (Carriker). Nineteen skins.

This is the common *Formicarius* of the Caribbean lowlands and the Pacific lowlands of the northwestern portion of Costa Rica, from the

Gulf of Nicoya northward. It is found from sea-level up to an altitude of not much more than 1,200 feet, and like the preceding species inhabits only the heavy forest. I found it particularly abundant in the valley of the Sicsola river, Talamanca, where I secured a nest on March 25, 1904, containing one fresh egg. The nest was a very frail, flat, loosely built structure, composed of twigs and leaves, and lined with a few half-decayed leaves, and placed in a low, large-leaved plant about two feet from the ground in the heavy forest.

The single egg is dark greenish-olive, heavily blotched with different shades of burnt umber. Measurements:  $27 \times 20.5$  mm.

The habits of this species are identical with those of the preceding, both birds walking about over the ground like a little rail. They can run very fast, but never hop, and when frightened spread their wings to assist them in running, or take short low flights. While walking the tail is always held erect, in almost a perpendicular position, which greatly adds to the rail-like appearance of the bird.

### 361. *Formicarius rufipectus* Salvin.

*Formicarius rufipectus* SALVIN, P. Z. S., 1866, 73, pl. 8 (Santiago de Veragua [Arcé]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 306 (Veragua [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 235 (Veragua). — RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 685 (Veragua and Ecuador?).

*Formicarius castaneiceps* CARRIKER, Ann. Carnegie Museum, IV, iii and iv, 1908, 301 (Juan Viñas, Costa Rica, May 7, 1907 [M. A. Carriker, Jr.]).

Carnegie Museum: Juan Viñas, May 7, 1907, ♂ (Carriker).

The first record for the taking of this rare species in Costa Rica was that published by myself under the name of *Formicarius castaneiceps* sp. nov. (Ann. Carneg. Mus., IV., 1908, 301). The single male secured at Juan Viñas seemed different from the rather meagre description of this species and since there were no birds in this country for comparison, I described it as new. Mr. Bangs had in his collection a single female of a *Formicarius* from northern Colombia, which resembled my specimen but apparently differed sufficiently to be sub-specifically distinct. Accordingly we sent the two birds to the British Museum for comparison with the type of *F. rufipectus* and found that my bird was identical with it in every respect, both the type and my specimen being males. Upon looking up the description of *Formicarius thoracicus* Taczanowski & von Berlepsch, we found that in this closely allied species (given as a synonym of *rufipectus* by Salvin and Godman but certainly incorrectly) the female differed

from the male in precisely the same manner as Mr. Bangs' Colombian female differed from my Costa Rican male of *F. rufipectus*, so that we decided that the Colombian bird was a female of *F. rufipectus*, hitherto undescribed. Since the published description of this species is rather meagre, I herewith give a full description of both sexes.

*Male*. — Whole pileum and nape very dark chestnut-maroon, brighter on the nape; lores, superciliary stripe, sides of head and neck and whole of throat deep black; rump and exposed portion of wings rich clove-brown; upper tail-coverts rich chestnut-maroon, brighter than pileum; rectrices blackish, edged with olive-brown basally; whole chest rich dark chestnut-brown, connected with the chestnut-maroon of nape by a narrow collar around sides of neck; breast and median portion of abdomen paler chestnut-rufous, becoming more cinnamon-rufous posteriorly; sides and flanks dark grayish-olive; under tail-coverts color of chest; inner webs of remiges sooty-gray; primaries cinnamon-ochraceous basally; under wing-coverts pale cinnamon-ochraceous basally and black apically; bill black; tarsi and feet dark horn-color; iris hazel. Measurements: length, 208 mm.; wing, 90; tail, 57; culmen, 23; tarsus, 42.

*Female*. — Differs from the male in being more ashy on the back, with the wings more olive than clove-brown; the sides and flanks decidedly slate-gray; the chest paler, about the color of the breast of the male, while the breast and median portion of the abdomen is pale fulvous, almost ochraceous. The measurements are practically the same as for the male. (Specimen from Rio Cali, Colombia, collected by Mervyn G. Palmer, coll. O. Bangs.)

### 362. *Pittasoma michleri zeledoni* Ridgway.

*Pittasoma michleri zeledoni* RIDGWAY, Proc. U. S. Nat. Mus., VI, 414 (Rio Súcio, Costa Rica, 1881, J. Cooper, collector). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Jiménez, one specimen).

*Pittasoma zeledoni* SCLATER, Cat. Birds Brit. Mus., XV, 1890, 310 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 238 (Costa Rican references).

U. S. Nat. Museum: Jiménez (Alfaro), Turrialba (Zeledón).

Bangs Collection: Carrillo, Oct., 1898, ♂ (Underwood).

Carnegie Museum: Rio Sicsola, Sept. 7, ♀; Sept. 10, ♂; Oct. 10, 1904, ♀ (Carriker).

This is another exceedingly rare bird, probably found only in Costa Rica and southeastern Nicaragua, but thus far known only from

Costa Rica. Apparently there are no specimens of it in Europe, while in this country there are but two or three skins in the U. S. National Museum, one in Mr. Bangs' collection, and three in the Carnegie Museum. I have seen the bird near Jiménez, back in the hills, but did not secure it, while Underwood has taken at least two specimens at Carrillo, making the range of the bird fairly continuous over the whole length of the Caribbean foothill region. It is not found in the lowlands, only from the beginning of the foothills up to about 2,500 feet. The alarm note of this species is loud and harsh, of a very peculiar tone, and when once heard can never be forgotten or confused with anything else. It is very shy, and not entirely terrestrial, as I have seen it perched on low limbs at least six feet from the ground.

363. *Grallaria guatemalensis princeps* (Sclater and Salvin).

*Grallaria princeps* SCLATER and SALVIN, P. Z. S., 1869, 418 (Veragua [Arcé]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Turrialba, one specimen). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 314 (Irazú district [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 241 (Costa Rican references).

U. S. Nat. Museum: Faldas de Barba (Alfaro), Turrialba (Zeledón), Irazú (collector unknown).

Bangs Collection: Escazú, ♂ and ♀; Tenorio, ♀ (Underwood).

Fleming Collection: Irazú, ♀ (Underwood).

Carnegie Museum: Juan Viñas, ♂ (Carriker); Carrillo, ♂ (Underwood).

I have carefully compared a series of seven specimens of *Grallaria princeps* from Chiriquí and Costa Rica with the Guatemalan bird, *G. guatemalensis*, and find that the differences between the two are very slight, that of size being the principal distinction. The southern birds are a little smaller (the wing being 8 mm. shorter) and are darker above, the back being richer olive-green, with the edgings of the feathers decidedly black, instead of sooty-brown as in *guatemalensis*; while the crown and nape are more slate-gray than ashy as in the northern bird.

As for the Mexican bird, two specimens of which I have examined, it seems to be nothing more than a subspecies of *guatemalensis*, being a small race, colored about the same as *guatemalensis*, perhaps a little darker, and should be denominated *Grallaria guatemalensis mexicana* (Sclater).

This is a very rare bird in Costa Rica and little or nothing is known

concerning its habits. Considering the location of the various places where specimens are known to have been taken, I should say that the bird had about the same range in Costa Rica as *Formicarius castaneiceps*, that is upon the higher portions of the Caribbean watershed, from about 1,500 feet up to perhaps 4,000 feet. It inhabits the most tangled jungles, is probably strictly terrestrial, and very solitary in its habits. I have never heard any call which could be attributed to this species, although it very probably has one. The specimen which I secured at Juan Viñas was taken in a rat-trap set beside a small creek in the forest for water opossums, so that I never saw the bird alive.

### 364. *Hylopezus dives* (Salvin).

*Grallaria dives* SALVIN, P. Z. S., 1864, 582 (Tucurríqui, Costa Rica [Arcé]).— LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (Tucurríqui [Arcé]).— ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 323 (Tucurríqui, two skins, types [Arcé]).— CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 534 (description of a young bird; Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 243 (Costa Rican references).

*Hylopezus* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 71 (type, *Grallaria perspicillata* Lawrence).

U. S. Nat. Museum: Jiménez (Alfaro), ♂ juv., Aug., 1889.

Bangs Collection: La Vijagua, Feb. 19, 1908, ♀ (Underwood).

Carnegie Museum: Guácimo, Dec. 4, 1903, ♂ (Carriker).

The type of this rare bird was taken at Tucurríqui by Arcé, in 1863, when two specimens were secured. No others were taken in Costa Rica (but several in eastern Nicaragua) until 1889, when Alfaro secured an immature male at Jiménez, which was described by Mr. Cherrie (see reference cited above). I know of no other specimens which have been taken in Costa Rica besides the one taken in 1908 by Underwood and the single male which I secured at Guácimo.

The range of this species covers the lower foothills of the Caribbean slope in Costa Rica and Nicaragua, from about 1,000 to 2,500 feet. Like the other species of the genus, it is found in the heavy forest and is almost entirely terrestrial in its habits. Its call is probably similar to the other two closely related species found in Costa Rica.

### 365. *Hylopezus intermedius* (Ridgway).

*Grallaria perspicillata* LAWRENCE, Ann. Lyc. N. Y., IX, 110 (Angostura [J. Carmiol]). — BOUCARD, P. Z. S., 1878, 62 (San Carlos). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 325 (Valsa [Carmiol]).



*Grallaria intermedia* RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 406, footnote (Angostura and Talamanca). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115, *part* (Jiménez). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 534 (Jiménez [Alfaro]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 243 (Costa Rican references).

*Hylopezus* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 71 (type, *Grallaria perspicillata* Lawrence).

U. S. Nat. Museum: Santa Clara and Jiménez (Alfaro).

Bangs Collection: La Vijagua, four specimens (Underwood).

C. H. Lankester Collection: La Florida and El Hogar.

Carnegie Museum: Guápiles, three specimens (Carriker & Crawford); Guácimo, Cuábre, El Hogar, five specimens (Carriker).

This species, referred by early writers to *H. perspicillatus* of Panama, is easily distinguished from that bird by the ruddy flanks and under tail-coverts. Its Costa Rican range covers the whole of the Caribbean lowlands from sea-level up to about 800 or 900 feet. It scarcely gets into the foothills at all, but keeps to the level lands below. The upper edge of its range slightly overlaps the lower portion of that of *H. dives*, the two birds having been taken in the same locality in the lowermost portion of the foothills. It frequents the portions of the heavy forest which are least filled with undergrowth, and is usually found alone, or sometimes in pairs. It is not such a suspicious bird as *Formicarius* or *Gymnocichla*, and when suddenly flushed will frequently fly up on a log or low branch and sit perfectly quiet. The call is very similar to that of *Formicarius* and *Myrmeciza*, except that it is softer and weaker, and is very seldom repeated more than three times (that is, three notes altogether). Neither is it so much addicted to calling as is *Formicarius*, and will not respond so readily to the imitation of its note by the collector.

### 366. *Hylopezus lizanoi* (Cherrie).

*Grallaria intermedia* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115, *part* (Las Trojas and Pózo Azul de Pirrís).

*Grallaria lizanoi* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 342 (Las Trojas, Jan., 1886 [Alfaro]); Expl. Zool. en C. R., 1890-1, 1893, 44 (Lagarto, Boruca, Térraba, and Buenos Aires). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 243 (Costa Rican references). — BANGS, Auk, XXIV, 1907, 298 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Pózo Azul de Pirrís (Zeledón), Pózo del Pital (Cherrie), Las Trojas.

Bangs Collection: El General, Pózo Azul de Pirrís, Buenos Aires (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Terraba, and Boruca (Carriker). Fifteen skins.

This species takes the place of the preceding on the Pacific coast of Costa Rica. Its range is restricted, however, to the lowlands and foothills of the region south of Puntarenas, not being found in Nicoya or Guanacaste. It ranges to a higher altitude than does *intermedius*, getting up to about 1,500 feet, though not in abundance. Its habits are identical with those of *intermedius*, while its call is the same.

367. *Grallaricula flavirostris costaricensis* (Lawrence).

*Grallaria flavirostris* SCLATER, P. Z. S., 1858, 68 (Rio Napo, Ecuador). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 326 (Buena Vista [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1892, 245 (Costa Rican references).

*Grallaricula costaricensis* LAWRENCE, Ann. Lyc. N. Y., VIII, 1866, 347 (Barránca [F. Carmioli]); IX, 1868, 110 (Barránca [F. Carmioli]). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 415 (Navárro, Oct. 3, 1882 [J. Cooper]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 115 (Costa Rica).

Bangs Collection: Cariblanco de Sarapiquí, August, 1899, ♀ (Underwood).

Carnegie Museum: Volcan de Turrialba, 2,000 feet, April 23, 1903, ♀ (Carriker & Crawford).

This is another of the remarkably rare birds of Costa Rica. The type was taken by F. Carmioli at Barránca, April 10, 1865. Another specimen collected by Carmioli at Buena Vista some time afterward is in the British Museum. In 1882 J. Cooper took a single specimen at Navárro, which, as well as Lawrence's type is in the U. S. National Museum. The only other specimens which I know of from Costa Rica are the one in Mr. Bangs' collection and the one in the Carnegie Museum. From the localities cited above, the bird evidently ranges over the lower portions of the plateau region and the higher parts of both the Caribbean and Pacific slopes. There is some question about the Barránca record belonging to the Barránca near Puntarenas, since it may possibly refer to another Barránca on the eastern side of the plateau region, and if this is the case (which I strongly suspect), the bird is confined to the Caribbean watershed. The single specimen which I secured was taken in the dense humid forest in the foothills at the base of the Volcan de Turrialba. The bird was perched on a bit of underbrush about six feet from the ground, so that it is evident that the species is partly arboreal, a fact which the structure of the feet further bears out.

## Families DENDROCOLAPTIDÆ and FURNARIIDÆ.

## KEY TO THE COSTA RICAN SPECIES.

- a.* Not spotted, streaked, or vermiculated above or below (except rarely a few paler shaft-lines on throat); or if throat vermiculated, tail short and black, variously colored, and with rectrices either stiff or soft.
- b.* Rectrices stiff and harsh, with more or less acuminate tips and shafts projecting beyond vane of feather.
- c.* Tail comparatively short and sooty-black, rounded at end.
  - d.* Lower rump and upper tail-coverts rich ferruginous-chestnut; chest slightly paler than rump; abdomen rich clove-brown.
  - e.* Throat and sides of head ashy-gray, pileum decidedly darker than back. *Sclerurus canigularis.*
  - ee.* Throat ruddy-ochraceous; pileum scarcely darker than back. *Sclerurus mexicanus.*
  - dd.* Rump and tail-coverts concolorous with back (rich seal-brown); throat white, feathers edged with blackish; chest slightly ferruginous, center of feathers paler. *Sclerurus guatemalensis.*
- cc.* Tail longer, not rounded, and some shade of chestnut-brown, never blackish.
  - d.* Wings and tail same color (except tips of primaries dusky), some shade of chestnut or cinnamon-brown.
  - e.* Smaller (wing 72 mm.); wings, tail, and rump bright cinnamon-rufous; head and lower parts olive-gray. *Sittasomus sylvioides.*
  - ec.* Larger (wing 100 to 110 mm.).
    - f.* Pileum and lower parts ruddy-brown; wings and tail chestnut; tail 75 to 80 mm. *Dendrocincla homochroa acedesta.*
    - ff.* Pileum, back, and lower parts olive-brown (darker above) wings and tail very dark chestnut-brown; tail 100 mm. *Dendrocincla ridgwayi ridgwayi.*
  - dd.* Wings (median portion of secondaries and tertials) light buffy-cinnamon; tail deep chestnut; back olive-brown; below dark ochraceous-brown. *Dendrocincla anabatina saturata.*
- bb.* Rectrices soft, shaft not thickened or protruding.
  - c.* Wing-coverts bright cinnamon or chestnut-rufous.
  - d.* Tail bright chestnut or cinnamon-brown; back olive-brown.
  - e.* Tail chestnut; lower parts grayish-olive; smaller (wing 65 mm.; tail, 75 mm.).
  - f.* Crown and sides of head chestnut. *Acrorchilus erythrops rufigenis*, adult.
  - ff.* Crown concolorous with black. *Acrorchilus erythrops rufigenis*, juv.
  - ee.* Tail cinnamon-brown; lower parts ruddy-ochraceous; larger (wing and tail 97 mm.). *Philydor panerythrus.*
  - dd.* Tail dark grayish-brown (or slightly cinnamon on outer webs above); crown and nape chestnut.

- e. Back and chest grayish-sooty; chestnut on wing not confined to coverts, (juv. without chestnut crown).  
*Synallaxis pudica.*
- ee. Back and flanks grayish buff-brown; belly and throat white; chestnut on wings confined to coverts.  
*Synallaxis albescens latitabunda.*
- cc. Wing-coverts not bright chestnut.
  - d. Small (wing 60 mm.); tail part black and part cinnamon-rufous; rump cinnamon; ridge of maxilla straight, mandible curving upward.  
*Xenops genibarbis mexicanus.*
  - dd. Larger (wing 85 mm.); deep olive-brown above; ochraceous olive-brown below; throat plain buff-ochraceous, unmarked.
    - e. Smaller and paler (wing 83 mm.; tail 75 mm.); Pacific lowlands.  
*Automolus pallidigularis exsertus.*
    - ee. Larger and darker (wing 90 mm.; tail 80 mm.); Carribean lowlands.  
*Automolus cervinigularis hypophæus.*
- aa. Either spotted, streaked, barred or vermiculated above or below or both above and below.
  - b. Tail stiff and harsh, shafts thickened and curving downward, or if not very stiff, rectrices very acuminate or sharpened shafts protruding beyond end of feather.
  - c. Lower parts decidedly barred (at least on abdomen), or else streaked, and size large (wing 130 mm.).
    - d. Barred below.
      - e. Entire under parts as well as pileum and back more or less barred with black in wavy lines.
      - f. Larger; barring heavier and bars wider, very pronounced on back (wing 130; tail 134 mm.).  
*Dendrocolaptes sancti-thomæ sancti-thomæ.*
      - ff. Smaller; bars narrow, obsolete on back (wing 118; tail 115 mm.).  
*Dendrocolaptes sancti-thomæ hesperius.*
    - ee. Only abdomen and under tail-coverts barred with black; throat and chest streaked with buffy-white; pileum and nape with buffy shaft-lines.  
*Dendrocolaptes validus costaricensis.*
    - dd. Streaked below, size large; ruddy brown above and below; sides of head, throat, and breast streaked with buffy-white; chin and upper throat buffy-white.  
*Xiphocolaptes emigrans costaricensis.*
  - cc. Lower parts streaked or mottled, but not barred.
    - d. Bill long (50 mm.) and much decurved.  
*Campylorhamphus pusillus borealis.*
    - dd. Bill ordinary; not more than 35 mm. long.
      - e. Pileum unmarked (sometimes small obsolete shaft-spots).
      - f. Small (wing 77 mm.).
      - g. Bill wedge-shaped (mandible sloping upward);

tail very stiff; throat and chest vermiculated with buff-ochraceous; back brown.

*Glyphorhynchus cuneatus.*

gg. Bill ordinary; throat white; back, wings, and tail chestnut; breast spotted with buffy-white.

*Margarornis rubiginosa.*

ff. Larger (wing 100 mm.); pileum and lower parts olive-greenish; lower parts spotted with buff-ochraceous.

*Xiphorhynchus punctigula.*

ee. Pileum more or less streaked.

f. Back almost, if not quite, as heavily streaked as pileum.

g. Larger (bill 36 to 39; wing 110 to 118 mm.).

h. Whole back and lower parts buffy, each feather broadly edged with black, giving a spotted appearance.

*Xiphorhynchus lacrymosus eximius.*

hh. Back and lower parts merely with broad shaft-stripes of buff-ochraceous, rather broadly bordered with black on back and more narrowly on chest.

*Xiphorhynchus flavigaster* (extralimital).

gg. Smaller (bill 26; wing 92 mm.); pileum, throat, and lower parts heavily streaked with buffy-white, strongly edged with black on lower part; back sparingly, but strongly, streaked.

*Picolaptes compressus compressus.*

ff. Back unmarked, or with only a few inconspicuous shaft-streaks.

g. Entire under parts (except throat immaculate buff-ochraceous) broadly streaked with buffy, edged with black; pileum and nape with spatulate buffy spots.

*Picolaptes affinis neglectus.*

gg. Only chest streaked with buff-ochraceous, and scarcely, or not at all edged with black.

h. Larger (wing 107; bill 35 mm.); pileum and nape with spatulate spots of buff-ochraceous; buffy streaks on chest broad and oval, slightly edged with black.

*Xiphorhynchus nanus costaricensis.*

hh. Smaller (wing, 100; bill, 23 mm.); pileum with only fine shaft-lines of buffy; spots on chest more wedge-shaped, and not edged with black.

*Deconychura typica.*

bb. Tail soft, shafts ordinary, although rectrices often very acuminate.

c. Pileum and back with shaft-streaks of buff-ochraceous; throat im-

maculate buff-ochraceous; lower parts scarcely streaked.

*Hyloctistes virgatus.*

cc. Pileum and back scarcely streaked, at least with not more than a few buffy shaft-lines.

d. Whole throat and breast strongly washed with ruddy; pileum brownish-black; back seal-brown.

e. Entire bill black.

*Rhopoctites rufo-brunneus.*

ee. Mandible largely yellowish horn.

*Xenicopsis subalaris lineatus*, juv.

dd. Throat not ruddy, but white or buffy-white, more or less mottled with dusky.

e. Tail brownish-black.

f. Small (wing, 62 mm.); throat buff-ochraceous; lower parts strongly spotted with buff-ochraceous.

*Premnoplex brunnescens brunneicauda.*

ff. Larger (wing, 87 mm.); throat white, feathers edged with blackish; chest dull chestnut; back, breast, and abdomen deep umber-brown (also under (a)).

*Sclerurus guatemalensis.*

ee. Tail chestnut or cinnamon-brown.

f. Rump and lower tail-coverts cinnamon-brown; belly cinnamon-ochraceous; pileum black; breast buffy, feathers edged with black. *Pseudocolaptes lawrencii.*

ff. Rump and lower tail-coverts olive-brown.

g. A few buffy shaft-lines on upper back; chest and breast narrowly streaked with buffy; throat buff-ochraceous.

*Xenicopsis subalaris lineatus*, adult.

gg. Back and lower parts without streaks; throat and upper chest buffy-white, feathers narrowly edged with dusky; a cinnamon-ochraceous superciliary line.

*Xenicopsis variegaticeps.*

### 368. *Synallaxis albescens latitabunda* Bangs.

*Synallaxis albescens* SCLATER, Cat. Birds Brit. Mus., XV, 1890, 43, *part* (Veragua, southward). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 147, *part* (Veragua, southward into South America). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 38 (Térraba and Buenos Aires, three specimens; first record north of Panama).

*Synallaxis albescens latitabunda* BANGS, Auk, XXIV, 1907, 298 (type from Boruca, Costa Rica, adult ♂, collection E. A. and O. Bangs; May 31, 1906, by C. F. Underwood; other specimens from Paso Real and Barránca de Térraba).

Bangs Collection: Buenos Aires (Underwood).

Carnegie Museum: Boruca and Buenos Aires (Carriker). Six skins.

This bird was first recorded from Costa Rica by Mr. Cherrie in 1893, under the name of *S. albescens*, but no more examples were taken until 1906, when Underwood secured five specimens in the Térraba Valley. Its northern limit is the head of the Térraba Valley. It inhabits the clumps of bushes and weeds in the savannas and the low scrub along their borders. It is very shy and not easily secured. I found the birds more abundant about Buenos Aires than in any other locality, but there they lived in the dense second-growth scrub and were almost impossible to secure. Their alarm-note is quite similar to that of *S. pudica*, but much weaker, and not so harsh, neither are they so noisy as that species.

### 369. *Synallaxis pudica* Sclater.

*Synallaxis pudica* SCLATER, P. Z. S., 1859, 191 ("Bogotá," Colombia); Cat. Birds Brit. Mus., XV, 1890, 45 (Nicaragua to Ecuador; Péje, Costa Rica [Carmioli]). — SALVIN, Ibis, 1870, 110 (crit.). — BOUCARD, P. Z. S., 1878, 59 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Las Tijas, Pózo Azul de Pirris, Naránjo de Cartago, Pacuare). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 149 (Honduras to Ecuador; Costa Rican references). — BANGS, Auk, XXIV, 1907, 299 (Boruca, El Pózo [Underwood]).

*Synallaxis nigrifumosa* LAWRENCE, Ann. Lyc. N. Y., IX, 105 (Pacuare [Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Basulto; Ridgway; Zeledón; Alfaro).

Bangs Collection: El General de Térraba and Pózo Azul de Pirris (Underwood).

C. H. Lankester Collection: Guácimo.

Fleming Collection: Carrillo and Pózo Azul de Pirris (Underwood).

Carnegie Museum: El Hogar, Carrillo, El Pózo de Térraba, Buenos Aires, Pózo Azul de Pirris (Carriker); Guápiles (Carriker and Crawford). Fourteen skins.

*Synallaxis nigrifumosa* Lawrence, described from Greytown, Nicaragua, and to which he refers Costa Rican specimens, does not admit of recognition, even as a subspecies, although specimens from north-eastern Costa Rica are slightly different from those from the southwestern section. They differ slightly from Térraba specimens in being a little smaller, more olive-brown above, a little darker below, and in having the chestnut of the pileum and wings a trifle darker and richer. These differences are very small, and in my judgment do not admit of

the separation of the northern bird. The species has a very general distribution over Costa Rica, covering the lowlands of both coasts (but is very rare in Guanacaste) up to 3,000 feet on the Caribbean (Juan Viñas, one specimen by Boucard) and up to perhaps not more than 1,500 to 2,000 feet on the Pacific. They frequent high grass along streams, old abandoned fields, bushes, and weeds in pastures and the edges of woodland, always keeping near the ground, and, when flushed, will make only low short flights like a rail. They are very noisy, making a curious rattling, chattering noise when disturbed. Breeding begins in May and continues until the end of July, the birds probably rearing two broods. I observed many nests in the vicinity of Guápiles, Jiménez and El Hogar as well as at Pózo Azul de Pirrís and in the Terraba Valley, and all were built almost exactly alike and precisely after the manner of *S. albescens* as given by Salmon (Biologia, II, 148).

The nest is placed in a small shrub or tree, is built entirely of twigs, even sticks as large as a lead-pencil being used. The shape is either globular or elliptical, with a long tunneled entrance made of interlaced twigs just large enough for the passage of the bird. The nest itself is usually about ten to twelve inches in diameter and the entering passage-way from eight to fourteen inches in length. The top of the structure is covered over with a mat of leaves and trash in some instances, but not always. There is usually no lining whatever to the nest cavity, the eggs being placed on the twigs composing the bottom of the nest. From two to three eggs are laid, which are pale bluish-white without markings. Measurements: 21 to 22 × 16 to 17 mm.

### 370. *Acrochilus erythrops rufigenis* (Lawrence).

*Synallaxis erythrops* (not of Sclater) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 105 (Barranca and Dota [F. Carmiol], Birrís [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica). — BOUCARD, P. Z. S., 1878, 59 (Volcan de Irazú and Navarro). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Rio Súcio).

*Siptornis erythrops* SCLATER, Cat. Birds Brit. Mus., XV, 1890, 60, *part* (Costa Rica to Ecuador). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891 151, *part* (Irazú [Rogers]; Costa Rican references).

*Synallaxis rufigenis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 105 (Costa Rica, Garcia collection). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica). — SALVIN, P. Z. S., 1870, 191 (Costa Rica [Carmiol]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Costa Rica).

*Siptornis rufigenis* SCLATER, Cat. Birds Brit. Mus., XV, 1890, 60 (♂ — Costa



Rica [Carmioll]. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 152 (Costa Rican references).

*Acrorchilus* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 71 (gen. nov.; type, *Synallaxis erythrops* Sclater).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), El Copey, La Lagunaria, and Santa Maria de Dota (Basulto), La Estrella de Cartago (Alfaro), Jiménez (Verrill).

Bangs Collection: Azahár de Cartago and Escazú (Underwood).

Fleming Collection: La Hondura (Underwood).

Carnegie Museum: La Hondura and Juan Viñas (Carriker). Four skins.

The name of *Synallaxis rufigenis* Lawrence was given to an immature specimen of what was then called *Synallaxis erythrops* Sclater. However, the Costa Rican bird proves to be distinct from *erythrops*, and must accordingly be called *A. erythrops rufigenis*. I have skins of this species in the immature plumage, without a trace of chestnut on the pileum, and one in the transition stage, showing the new chestnut feathers growing out, which proves conclusively that the name *rufigenis* of Lawrence was based on an immature bird.

The species inhabits only the highlands, but occasionally straggles down on the Caribbean slope to 2,000 and even 1,000 feet. It is most abundant in the humid forests of the Dota Mountains and on the upper Caribbean slope at about 3,000 to 4,000 feet. It is found only in the heavy forest, but is fond of low vine-covered trees, and is frequently seen in the company of other Dendrocolaptine species and even tanagers and finches.

### 371. *Pseudocolaptes lawrencii* Ridgway.

*Pseudocolaptes boissoneauti* BOUCARD, P. Z. S., 1878, 59 (Navárro).

*Pseudocolaptes lawrencii* RIDGWAY, Proc. U. S. Nat. Mus., I, 1878, 253 (La Palma and Navárro; type from La Palma [Zeledón]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 79 (Veragua and Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 153 (Costa Rican references).

*Pseudocolaptes costaricensis* BOUCARD, Bull. Soc. Zool. Fr., V, 1880, 230 (Costa Rica).

U. S. Nat. Museum: El Rey and Las Vueltas de Dota (Basulto), El Roble de Irazú (Cherrie).

Bangs Collection: Volcan de Irazú and Escazú (Underwood).

Carnegie Museum: Escazú, Volcan de Turrialba, Ujurrás de Térraba (Carriker). Seven skins.

English ornithologists have expressed doubt as to the validity of this species with reference to *P. boissoneauti*, but after examining specimens of that species and carefully comparing them with Costa Rican specimens of *P. lawrencii*, I can see no ground for doubting the distinctness of the northern bird, it certainly being a well marked species. This tree-creeper is found only at high altitudes, seldom if ever being taken below 6,000 feet. I took two specimens at Escazú, somewhat below that altitude, and Boucard reports it from Navárrro, which would be lower, but such instances are rare. It is most abundant on the high volcanoes for about 1,000 feet below timber-line. I also took it in the Cordillera de Talamanca at about 7,000 feet. It is a very noisy bird, always chattering and continually moving about in the trees. It is usually seen in pairs.

372. *Rhopoctites rufo-brunneus* (Lawrence).

*Philydor rufo-brunneus* LAWRENCE, Ann. Lyc. N. Y., VIII, 1865, 127 ("San José" (?), Costa Rica [Frantzius]; coll. U. S. Nat. Mus.); IX, 1868, 106 (Barránca [J. Carmiol], San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica). — BOUCARD, P. Z. S., 1878, 59 (Navárrro).

*Automolus rufobrunneus* BERLEPSCH, Proc. U. S. Nat. Mus., XI, 1888, 565 (♂ — Barranca, April 18, 1864 [J. Carmiol]; Lawrence's type (?); crit.). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 89 (Irazú district [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 154 (Costa Rican references).

*Rhopoctites* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 72 (type, *Philydor rufo-brunneus* Lawrence).

U. S. Nat. Museum: Coliblanco (Zeledón) El Rey de Dota (Basulto), Volcan de Irazú (Underwood), La Estrella de Cartago (———?).  
Bangs Collection: Carrillo, Azahár de Cartago, and Escazú (Underwood).

C. H. Lankester Collection: La Palma de San José.

Carnegie Museum: Escazú, La Hondura, Ujurrás de Terraba (Carriker). Ten skins.

Mr. Ridgway has recently created a new genus for this species of *Automolus*, on the ground of its stouter, less compressed, and distinctly uncinuate bill, and the shafts of the rectrices being more rigid at the tip. The differences appear to be rather small, but not less than in many other recognized genera.

The species inhabits the heavy, damp forests of the mountains, only descending to lower altitudes on the Caribbean slope into some of the

deep gorges, such as that of the Rio Súcio, where all of the highland fauna tends to inhabit lower levels. Its habits are those of *Automolus*, frequenting low tangled jungle, especially masses of vines, where it hops about from limb to limb, but does not do much climbing. It is not an abundant bird in any locality, and must always be sought for in the cool, wet undergrowth along the side of some ravine or beside a little mountain brook. It is much more noisy than *Automolus*, in that respect resembling *Pseudocolaptes*.

### 373. *Hyloctistes virgatus* (Lawrence).

*Philydor virgatus* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 468 (Angostura, Costa Rica, Oct. 7, 1866 [J. Carmiol]; coll. U. S. Nat. Mus.); IX, 1868, 106 (Angostura [J. Carmiol]). — SCLATER, Cat. Birds Brit. Mus., XV, 1891, 96, foot-note).

*Automolus virgatus* BERLEPSCH, Proc. U. S. Nat. Mus., XI, 1888, 565 (Angostura [Lawrence's type]; crit.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 155 (Costa Rican references). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 534 (San Carlos [Alfaro]); Expl. Zool. en C. R., 1891-2, 1893, 39 (Palmar, one specimen). — BANGS, Auk, XXIV, 1907, 299 (El Pózo de Térraba [Underwood]).

*Hyloctistes* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 72 (type, *Philydor virgatus* Lawrence).

Bangs Collection: La Vijagua, Carrillo, and Jiménez (Underwood).

C. H. Lankester Collection: El Hogar.

Fleming Collection: Reventazón (Underwood).

Carnegie Museum: Carrillo, El Hogar, El Pózo de Térraba, and Boruca (Carriker). Five skins.

Mr. Ridgway has characterized a new genus of which this species is the type, giving it as related to *Philydor* Spix but with a relatively much longer bill (exposed culmen much longer than tarsus), and differing from *Automolus* in more extensive cohesion of the anterior toes, the basal phalanx of the middle toe being entirely united to both lateral toes.

The species is confined to the lowlands of the Caribbean and the southwestern Pacific, probably from the Rio Grande de Tárcoles southward, although there are no records for the species north of the upper Térraba Valley. It is found from near sea-level up to about 1,500 feet, and inhabits the dense undergrowth of the opener parts of the forest. Its habits are the same as those of *Automolus*. If it has any call I have never heard it, while the bird is inclined to be more sluggish than most of the Dendrocolaptine forms.

374. *Automolus cervinigularis hypophæus* Ridgway.

*Anabates cervinigularis* SCLATER, P. Z. S., 1856, 288 (Cordova, Mexico [Sallé]).

*Automolus cervinigularis* SCLATER, P. Z. S., 1864, 175; Cat. Birds Brit. Mus., XV, 1890, 91 (Valsa [Carmioli]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (Pacuare [J. Carmiol], Angostura [F. Carmiol], Cartago [Cooper]). —FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica). —ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Rio Súcio, Jiménez, Cartago (?)). —SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 159 (Tucurríqui [Arcé], Valsa [Carmioli]). —RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 497 (Rio Frio).

*Automolus cervinigularis hypophæus* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 72 (type from Guayábo, Costa Rica, March 19, 1908 [Francisco Baskett]; coll. U. S. Nat. Mus.).

U. S. Nat. Museum : Jiménez (Alfaro), Rio Súcio (Cooper), Talamanca (Dr. King).

Bangs Collection : Talamanca, Carrillo, La Vijagua (Underwood).

Carnegie Museum : Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford) ; Cuábres, Rio Sicsola, El Hogar, Carrillo, Peralta (Carriker) ; Carrillo and Cariblanco de Sarapiquí (Underwood). Twenty-one skins.

This form was separated by Mr. Ridgway from *A. c. cervinigularis* on account of its darker color.

This is the most abundant species of the family in the Caribbean lowlands and lower slopes, up to about 2,000 feet, to which region it is confined, not being found on the Pacific slope, where it is replaced by the closely allied form, *A. pallidigularis exsertus*.

It is a quiet bird, only occasionally uttering a weak chirp. It is sometimes seen alone, but most frequently in the company of various species of ant-thrushes and other species of *Dendrocolaptidæ*. It is fond of the foraging ants, upon which in company with all the ant-thrushes it feeds.

I took a single nest of this bird on the Rio Sicsola, Sept. 12, 1904. It was placed in the hollowed top of a broken tree-trunk, ten feet from the ground, in the thick forest. The nest was composed of a few leaves and grasses and some fragments of a cast-off snake skin, and contained two eggs, of which one was almost upon the point of hatching, while the other was infertile. They are creamy-white, shaped very much like the eggs of our common Bob-white (short, and pointed at the smaller end), only a little less sharply pointed. Measurements of egg saved :  $31 \times 24$  mm.

375. *Automolus pallidigularis exsertus* (Bangs).

*Automolus pallidigularis* LAWRENCE, Ann. Lyc. N. Y., VII, 1862, 465 (Lion Hill, Panama).

*Automolus pallidigularis* (not of Lawrence) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (Guaitíl [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 94 (Costa Rica [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 159 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 38 (Boruca, Térraba, Buenos Aires, and Cabagra).

*Automolus exsertus* BANGS, Auk, XVIII, 1901, 367 (Divala, Chiriquí, Panama [W. W. Brown]; type in Bangs coll.); Auk, XXIV, 1907, 299 (Boruca, El Pózo, and Lagarto de Térraba [Underwood]).

U. S. Nat. Museum: Pózo Azul de Pirrís (Underwood).

Bangs Collection: El General, Buenos Aires de Térraba, and Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, Boruca, El Pózo de Térraba (Carriker); Pózo Azul de Pirrís (Underwood). Fourteen skins.

Upon comparison of skins of *A. pallidigularis* from Costa Rica and Chiriquí with specimens from Loma del Leon, Panama (type locality of *A. pallidigularis* Lawrence), I find that the differences between the two forms are too small to admit of specific distinction for the northern form, and I have therefore made Mr. Bangs' *A. exsertus* a subspecies of *A. pallidigularis* Lawrence, to which it is most nearly allied.

In Mr. Bangs' paper on the birds of the Térraba Valley (Auk, XXIV, 1907, 299), appears a printer's error which should be corrected. Under *A. virgatus* he says: "This is of course the bird recorded by Cherrie as *A. pallidigularis*." This remark should have been placed by the compositor under the following species, *A. exsertus*, to which it very obviously refers.

In Costa Rica this bird is confined to the southwestern Pacific lowlands, from the Rio Grande de Tárcoles southward. It is abundant at Pózo Azul de Pirrís and in the Térraba Valley. Its habits are the same as those of *A. cervinigularis hypophæus*.

376. *Philydor panerythrus rufescens* (Lawrence).

*Philydor rufescens* LAWRENCE, Ann. Lyc. N. Y., VIII, 1866, 345 (Birris, Costa Rica [Zeledón], May 15, 1865; coll. U. S. Nat. Mus.); IX, 1868, 106 (Birris [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 414 (Cervantes, 1882 [Cooper]).

*Philydor panerythrus* BERLEPSCH, Proc. U. S. Nat. Mus., XI, 1888, 565 (Birris, Costa Rica [Zeledón], crit.). — SCLATER, Cat. Birds Brit. Mus., XV, 1890,

100, *part* (Costa Rica [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 160, *part* (Costa Rican references).

*Philydor rufus panerythrus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Cervántes).

*Philydor panerythrus rufescens* BANGS, Proc. N. Eng. Zool. Club, VIII, 1902, 44 (Chiriquí, Panama).

U. S. Nat. Museum: El Rey and La Lagunaria de Dota, ♂ and 2 ♀'s (Basulto).

This is one of the rarest of the Central American *Dendrocolaptidæ*, not only in Costa Rica, but throughout its range. I know of but ten skins in existence, of which three are from Panama and the remainder from Costa Rica, one in the Salvin and Godman collection, one in the Museo Nacional de Costa Rica and five in the U. S. National Museum.

The bird is evidently confined to the higher portions of the country, all those from Costa Rica having been taken from 3,000 feet upwards. I know nothing concerning the habits of the birds and have never seen it in life.

### 377. *Xenicopsis variegaticeps* (Sclater).

*Anabazenops variegaticeps* SCLATER, P. Z. S., 1856, 289 (Cordova, Mexico [Sallé]).

— LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (Dota [J. Carmiol], Barránca [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica). — BOUCARD, P. Z. S., 1878, 59 (La Candelaria). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 414 (Rio Súcio [J. Cooper]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 106 (Costa Rica [Carmioli]; Mexico to Veragua). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 162 (Costa Rican references).

U. S. Nat. Museum: El Rey, Santa Maria, and La Lagunaria de Dota (Basulto).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Juan Viñas, Ujurras de Terraba (Carriker). Two skins.

This species is confined to the mountains of the central portion of the country up to at least 7,000 feet, extending down the Caribbean slope to about 1,800 or 2,000 feet. It is not found on the lower slopes of the Pacific, but only in the higher parts of the mountains where humid conditions prevail, such as the high Talamancan Cordillera and the Dota Mountains. It is found in the heavy forest, but keeps well up in the trees, climbing up the tree-trunks and branches more like the true *Dendrocolaptidæ*.

378. *Xenicopsis subalaris lineatus* (Lawrence).

*Anabates subalaris* SCLATER, P. Z. S., 1859, 141 (Ecuador).

*Anabazenops lineatus* LAWRENCE, Ann. Lyc. N. Y., VIII, 1865, 127 (Angostura, Costa Rica, April 21, 1864, ♀ [J. Carmiol], coll. U. S. Nat. Mus.); IX, 1868, 106 (Angostura [J. Carmiol], Birris and Cervantes [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica).

*Anabazenops subalaris* SCLATER, Cat. Birds Brit. Mus., XV, 1890, 108, *part* (Irazú district [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 163 (Costa Rican references).

*Anabazenops subalaris lineatus* BERLEPSCH, Proc. U. S. Nat. Mus., XI, 1888, 565 (Angostura [Lawrence's type]; *crit.*).

U. S. Nat. Museum: El Rey, La Lagunaria, and Santa Maria de Dota (Basulto), El Naránjo de Cartago (= Juan Viñas) (Zeledón); Volcan de Irazú, and La Estrella de Cartago (———?).

Bangs Collection: Volcan de Irazú and Azahár de Cartago (Underwood).

Carnegie Museum: La Hondura, Juan Viñas (Carriker), nine skins; Cariblanco de Sarapiquí and Volcan de Irazú (Underwood), two skins.

The immature birds of this species exhibit a peculiar phase of coloration, having the whole of the throat, sides of neck, chest, and upper breast suffused with chestnut-rufous, much the same color as the lower parts in *Rhopoctites rufo-brunneus*.

The Costa Rican range of this species is practically the same as that of the preceding, also the habits and habitat. Neither are common birds, the present species probably being the rarer of the two.

379. *Xenops genibarbis mexicanus* (Sclater).

*Xenops mexicanus* SCLATER, P. Z. S., 1856, 289 (S. Mexico); LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (Angostura, San José, and Pacuare [J. Carmiol], Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica).

*Xenops genibarbis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Jiménez, Angostura, Pózo Azul de Pirris). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 110, *part* (Tucurrique [Arcé], San José [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 164 (Costa Rican references; Mexico to Panama). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 39 (Palmar, Lagarto, Boruca, Terraba, Buenos Aires). — UNDERWOOD, Ibis, 1896, 440 (Miravalles to Bebedero).

*Xenops genibarbis mexicanus* BANGS, Auk, XXIV, 1907, 299 (Boruca, Paso Real, El Pózo, and Lagarto de Terraba [Underwood]).

U. S. Nat. Museum: Pígres (Ridgway), Bonilla (Alfaro), Jiménez (Alfaro), Pózo Pital (Cherrie), Pózo Azul de Pirris and Guayabal (Underwood).

Bangs Collection : El General de Térraba, Tenorio, Coralillo, Bolson, La Vijagua and Pózo Azul de Pirris (Underwood).

C. H. Lankester Collection : Tuís, Miravalles, and El Hogar.

Carnegie Museum : Guápiles (Carriker & Crawford); Pózo Azul de Pirris, Carrillo El Pózo de Térraba, El Hogar, Boruca, Buenos Aires (Carriker); Pózo Azul de Pirris (Underwood). Eighteen skins.

Birds from British Honduras seem to differ slightly from specimens from southwestern Costa Rica in being deeper olive-brown below and ruddier above, with the submalar streak averaging longer and broader. Apparently Costa Rican birds are not typical *mexicanus*, being about intermediate between *X. genibarbis genibarbis* of Colombia and the northern bird (taking British Honduras specimens as typical *mexicanus*). Birds from southwestern Costa Rica are on the average paler than those from the northern and eastern sections and are probably a little nearer true *genibarbis* than *X. g. mexicanus*. However, the greater portion of Costa Rican specimens are referable to *mexicanus*, and I have accordingly called them all by that name.

The species ranges over the whole of the lower portions of both Caribbean and Pacific slopes as well as the lowlands proper, and has been recorded from as high as 3,000 feet on the eastern slope, but very rarely from that elevation on the western side. It is exclusively a bird of the forest, but does not as a rule go up very high in the trees, preferring the tangled masses of vines and underbrush to the more open forest.

### 380. *Xenops rutilus* Lichtenstein.

*Xenops rutilus* LICHTENSTEIN, Verz. Doubl., 17 (South Brazil). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 111 (Costa Rica to Brazil and Bolivia; Costa Rica [Carmioli], one ad. ♂, coll. Salvin and Godman). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 165 (Costa Rican references). *Xenops heterurus* SALVIN, Ibis, 1869, 319 (Costa Rica [Carmioli], coll. Salvin and Godman).

There is but one specimen known from Costa Rica of this species of *Xenops*, and were it not for the unquestionable authenticity of that record I would hesitate to include the species in the Costa Rican ornithology. At best it must be classed only as a very rare straggler so far north. Unfortunately the specimen collected by Carmioli has no locality indicated other than Costa Rica.



381. *Sclerurus canigularis* Ridgway.

*Sclerurus canigularis* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 542 (Turrialba, Costa Rica, August, 1886 [J. Cooper]; coll. U. S. Nat. Mus.); XII, 1889, 24. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 166 (Costa Rica). — RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 613 (Buena Vista, Aug., 1892 [Castro and Fernandez]).

*Sclerurus albigularis* SCLATER, Cat. Birds Brit. Mus., XV, 1890, 114, *part* (in synonymy).

Bangs Collection: Tenorio, Cerro de Santa Maria and Cariblanco de Sarapiquí (Underwood). Eight skins.

This *Sclerurus* has been taken only in Costa Rica, but outside of the eight skins taken by Underwood in 1908 there are but two specimens in existence, including the type. There has been some doubt as to the distinctness of this bird from *S. albigularis* of South America, but after examining the large series in Mr. Bangs collection, it is very evident that it is perfectly distinct, not being related even subspecifically to that species. The bird seems to be confined to the northern half of the country and to be most abundant in the mountains of the northwestern section, north of the Gulf of Nicoya, although the type came from the Caribbean slope at about 2,000 feet. I have never seen the bird in life, but I presume its habits are similar to those of *S. guatemalensis*.

382. *Sclerurus mexicanus* Sclater.

*Sclerurus mexicanus* SCLATER, P. Z. S., 1856, 290 (Córdoba, Mexico [Sallé]); Cat. Birds Brit. Mus., XV, 1890, 115 (Mexico to Amazonia; no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 167 (no Costa Rican specimens or references).

Bangs Collection: Cariblanco de Sarapiquí, one ♂ (Underwood).

Acad. Nat. Sci. of Philadelphia: Costa Rica (Underwood), one specimen without locality.

Fleming Collection: Cariblanco de Sarapiquí (Underwood), one specimen.

There are no authentic published records for the occurrence of this species in Costa Rica, but I have examined two skins from that country, collected by Underwood, while there is a third in Mr. Fleming's collection from Cariblanco which I have not seen. It is very strange that the bird should be fairly common in Guatemala and Mexico and so rare between Guatemala and Panama.

383. *Sclerurus guatemalensis* (Hartlaub).

*Tinactor guatemalensis* HARTLAUB, Rev. Zool., 1844, 370 (Guatemala).

*Sclerurus guatemalensis* SCLATER and SALVIN, Ibis, 1859, 118. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Jiménez and Pózo Azul de Pirrís). — RIDGWAY, Proc. U. S. Nat. Mus., XII, 1889, 30 (Sibuhue de Talamanca, 1873 [Zeledón]; San Carlos and Jiménez [Alfaro]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 117 (Guatemala to Ecuador; no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 168 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 440 (Miravalles). — BANGS, Auk, XXIV, 1907, 299 (Boruca, Paso Real and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Bonilla (Ridgway), La Concepcion de Jiménez (Cherrie).

Bangs Collection: La Vijagua, Cerro de Santo Maria, El General de Térraba (Underwood).

Carnegie Museum: El Hogar, El Pózo, Boruca (Carriker). Four skins.

Birds from northwestern Costa Rica are a little darker and more richly colored than skins from Guatemala and British Honduras, while Panama (Loma del Leon) skins are indistinguishable from the northern specimens. This is probably only individual variation, and at all events is not sufficient to warrant separating them as a local race. This is the most abundant species of the genus in Costa Rica, being found over the entire lowland region of both the Pacific and Caribbean, from near sea-level up to about 1,500 feet. It is found only in the thick dark forest, and is invariably encountered near the ground, oftentimes being flushed from the ground, where it had been scratching about among the leaves, in search of insects or larvæ. The bird in life has little resemblance to a true Dendrocolaptine bird. I have never heard it give any call or alarm-note, and have always found it alone and exceedingly shy.

384. *Margarornis rubiginosa* Lawrence.

*Margarornis rubiginosa* LAWRENCE, Ann. Lyc. N. Y., VIII, 1865, 128 ("San José" [Frantzius]; coll. U. S. Nat. Mus.); IX, 1868, 106 (San José [Frantzius], San Mateo [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Quebrada Honda). — BOUCARD, P. Z. S., 1878, 60 (Navárro). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (San Mateo). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 122 (San José [Calleja], Irazú district [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 170 (Costa Rica to Panama; C. R. references).

U. S. Nat. Museum: Volcan de Turrialba and Coliblanco (Ridgway)

and Zeledón), La Vueltas, La Lagunaria, El Rey and Santa Maria de Dota (Basulto), Burgos de Irazú (Castro), La Palma (——?).  
Bangs Collection: Volcan de Irazú and Carrillo (Underwood).

Carnegie Museum: Volcan de Irazú, La Hondura, Volcan de Turrialba, Ujurrás de Térraba (Carriker). Seventeen skins.

Distributed over the highlands and high mountains of the whole country, from about 3,000 feet up to timber-line, but very rare below 7,000 feet. It is a true tree-creeper in its habits, climbing about on the tree-trunks and limbs of the forest trees, and prefers the heavy humid forests exposed to the moisture of the Caribbean winds rather than the slopes leading down to the lower plateau region, which are drier. Like so many species of the higher Caribbean slope, it is abundant in the higher parts of the Dota Mountains and the Talamanca Cordillera wherever they reach up to 7,000 feet.

385. **Premnoplex brunnescens brunneicauda** (Lawrence).

*Margarornis brunnescens* (not of Sclater) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 ("San José" [Frantzius], Rancho Redondo, and Barranca [F. Carmiol], San Mateo [Cooper], Birris [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Quebrada Honda). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 415 (Rio Súcio [Cooper]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 11 (Turrialba). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 123, *part* (Rancho Redondo [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 170, *part* (Costa Rican references).

*Margarornis brunneicauda* LAWRENCE, Ann. Lyc. N. Y., VIII, 1865, 130, in text (Costa Rica).

*Premnoplex* CHERRIE, Proc. U. S. Nat. Mus., XIV, 339 (type, *Margarornis brunnescens* Sclater).

*Premnoplex brunnescens brunneicauda* BANGS, Proc. Biol. Soc. Wash., XXI, 1908, 157 (Costa Rica).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón) Turrialba (Cooper), Azahár de Cartago (Underwood).

Bangs Collection: La Hondura, Azahár de Cartago, Volcan de Irazú (Underwood).

C. H. Lankester Collection: La Palma de San José.

Carnegie Museum: Volcan de Irazú, La Hondura, Carrillo, Ujurras de Térraba (Carriker). Seventeen skins.

The Costa Rican race of *P. brunnescens* is very distinct from the Bogotan form and must be known by the name Lawrence proposed for it in 1865, which has possibly because of the lack of proper material for comparison been universally ignored by subsequent writers (until

resuscitated by Mr. Bangs). The Costa Rican bird may be distinguished from *P. b. brunnescens* by its larger size (wing about 6 mm. longer), relatively longer tail (10 mm. longer) and by its much paler color both above and below. The light spots (on the under parts) are about the same in the two birds, (a little paler in *brunneicauda*) but their edging is decidedly paler, being olive-brown instead of black, while the color of the remainder of the feather is grayish-olive instead of deep grayish-brown, the wings and upper parts are more olive-brown than umber, with the darker edgings more pronounced; the tail is also paler.

The species ranges over the highlands and mountains of Costa Rica from about 2,000 feet up to timber-line on the high volcanoes. It is not common below 5,000 feet, except on the Caribbean slope, where it is abundant down to about 3,500 feet. It is found only in the damp, dark, virgin forest, and when that has been cleared away the birds disappear. It is fond of frequenting the steep sides of dark ravines, always keeping close to the ground, like *Sclerurus*.

### 386. *Glyphorhynchus cuneatus* (Lichtenstein).

*Dendrocolaptes cuneatus* LICHTENSTEIN, Abh. Ak. Berl., 1820, 204, pl. 2, fig. 2 (Amazons?).

*Glyphorhynchus cuneatus* STRICKLAND, P. Z. S., 1841, 28. — BOUCARD, P. Z. S., 1878, 60 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Pacuare, Pózo Azul de Pirrís, and Naránjo de Cartago). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 124 (Southern Mexico to Argentina; Tucurríqui, Costa Rica [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 175 (Costa Rican references). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 497 (Rio Frio; descr. nest and eggs). — BANGS, Auk, XXIV, 1907, 299 (El Pózo de Térraba [Underwood]).

*Glyphorhynchus pectoralis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (Tucurríqui [Arcé]; coll. O. Salvin). — FRANTZIUS, Jour. für Orn., 1869, 304 (Agua-cate Mts.).

U. S. Nat. Museum : Reventazón (Carranza), Pózo Azul de Pirrís (Underwood), Rio Matina (Cherrie), Jiménez (Verrill), Bonilla (Ridgway and Zeledón).

Bangs Collection : Pózo Azul de Pirrís, La Vijagua, Buenos Aires, La Hondura, Carrillo (Underwood).

C. H. Lankester Collection : Guácimo and Cachí.

Carnegie Museum : Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Cuábre, Rio Sicsola, Guápiles, Carrillo, El Hogar, La Hondura, El Pózo de Térraba (Carriker). Twenty-one skins.

This curious little species ranges over the whole of the Caribbean lowlands up to 3,000 feet (rare above 2,000) and over the Pacific lowlands and foothills from the Gulf of Nicoya southward. I have seen no record from Guanacaste or the Nicoya peninsula. It is found in the heavy forest and is always seen busily climbing about on the tree-trunks and large limbs in search of insects. It usually keeps well up in the trees, and is quite solitary in its habits, even two birds of the same species being rarely seen in company. I found a single nest of the species on the northern slope of the Volcan de Turrialba at about 2,000 feet, which was taken on April 17, 1903, and contained two eggs with the incubation far advanced. The nest was in a natural cavity on the side of a tree, the entrance being secured through a small crack, while the nest itself was a loose mat of black rootlets about one quarter of an inch in thickness. The eggs are pure white, long, and bluntly pointed, and measured  $12 \times 19$  mm.

387. *Dendrocincla anabatina saturata* subsp. nov.

*Dendrocincla anabatina* SCLATER, P. Z. S., 1859, 54, pl. 150 (Omoa, Honduras [Leyland]); Cat. Birds Brit. Mus., XV, 1890, 162, *part* (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 172, *part* (no Costa Rican record). — OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1904, 452 (monogr.; Costa Rica). — BANGS, Auk, XXIV, 1907, 299 (Boruca, Paso Real and El Pózo de Térraba [Underwood]). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 39 (Palmár, Boruca and Térraba; first record for Costa Rica).

U. S. Nat. Museum: Pígres (Zeledón).

Bangs Collection: El General and Buenos Aires de Térraba, Pózo Azul de Pirrís (Underwood).

Carnegie Museum: El Pózo de Térraba and Buenos Aires (Carriker).  
Five skins.

Type from El Pózo de Térraba, Costa Rica; No. 28,570, Carnegie Museum, adult male; July 10, 1907; M. A. Carriker, Jr.

Differs from *D. a. anabatina* Sclater in being darker and more olivaceous. Pileum olive-brown, nearly concolorous with back, with scarcely a trace of the rufous so prominent in *D. a. anabatina*; tips of primaries blackish-sooty instead of grayish-sooty; tail darker and richer chestnut, with prominent blackish tips which are wanting or obsolete in true *anabatina*; the buffy-ochraceous of the throat darker and intermixed with grayish-olive (immaculate in *D. a. anabatina*); bill much darker, maxilla decidedly blackish. Measurements of type: length, 218; wing, 100; tail, 80 mm.

## MEASUREMENTS.

Average of *D. a. anabatina*.*D. a. saturata*.

4 males: wing, 98; tail, 84 mm.

3 males: wing, 99.6; tail, 83 mm.

6 females: wing, 94; tail, 83 mm.

3 females: wing, 95.3; tail, 78 mm.

This race of *D. anabatina* has thus far been found only in southwestern Costa Rica, from Pózo Azul southward, and extending down the Pacific lowlands of Chiriquí as far as David (at least). It ranges from sea-level up to about 1,500 feet, although it is more abundant below 1,000 feet. It is an inhabitant of the heavy virgin forest, creeping about on the tree-trunks continuously, and is very noisy (probably only the males during the breeding season), uttering harsh notes while running excitedly up a tree-trunk or hanging in one place for several minutes. It is quite shy and it is sometimes difficult to get within gunshot.

388. *Dendrocincla homochroa acedesta* Oberholser.

*Dendromanes homochrous* SCLATER, P. Z. S., 1859, 382 (Teotalcingo, Mexico [Boucard]). — SALVIN, Ibis, 1869, 319 (Costa Rica [J. Carmiol]).

*Dendrocincla homochroa* SCLATER and SALVIN, P. Z. S., 1868, 54. — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 414 (Navárrro [Cooper]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 163, *part* (Costa Rica [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 172, *part* (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 40 (Boruca, one specimen). — UNDERWOOD, Ibis, 1896, 440 (Miravalles).

*Dendrocincla homochroa ruficeps* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Las Trojas).

*Dendrocincla homochroa acedesta* OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1904, 463 (type locality, Chiriquí [Arcé]).

Bangs Collection: Miravalles, Bolson, and Tenorio (Underwood).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Miravalles (Carriker). Two skins.

This species in Costa Rica is rarely found outside of the Nicoya peninsula and Guanacaste, where it is not abundant. There is only one authentic record of a specimen from any other region, that of Mr. Cherrie from Boruca. Neither Mr. Underwood nor myself found it in the Térraba Valley, so that it must be very rare there. Mr. Ridgway records a specimen as having been collected by J. Cooper at Navárrro. I think there is every reason to doubt the correctness of the locality, and that the bird very probably came from San Mateo, where Cooper collected at different times, and where the bird might be rarely taken. At all events it is not a species of the Caribbean slope (Navárrro is on

the Caribbean at 3,000 to 4,000 feet), nor is it taken above 1,500 feet. Its habits are more like those of *D. ridgwayi* than *anabatina saturata*.

389. *Dendrocincla ridgwayi ridgwayi* Oberholser.

*Dendrocincla olivacea* LAWRENCE, Ann. Lyc. N. Y., VII, 1862, 466 (Panama). — RIDGWAY, Proc. U. S. Nat. Mus., X, 1887, 492 (Talamanca, Cartago, Pacuare). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 166 (Angostura [Carmioll]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 174, *part* (Costa Rican references).

*Dendromanes atrirostris* SALVIN, Ibis, 1869, 319 (Costa Rica [J. Carmioll]).

*Dendrocincla atrirostris* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Cartago and Pacuare).

*Dendrocincla olivacea olivacea* OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1904, 456 (Costa Rica).

*Dendrocincla ridgwayi* OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1904, 458 (Talamanca, Costa Rica [José Zeledón, 1873]).

U. S. Nat. Museum: Guayábo (Underwood), Reventazón (Carranza), Pacuare (Zeledón).

Bangs Collection: Carrillo and La Vijagua (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Cuábre, Rio Sicsola, El Hogar (Carriker). Seven skins.

The name of *Dendrocincla ridgwayi* which this species now bears is made necessary from the fact that *D. olivacea* Lawrence is preoccupied (authority of Dr. Richmond). Mr. Oberholser described a slightly aberrant specimen of the species under the name of *D. ridgwayi*, and as a consequence his name becomes applicable in place of *D. olivacea*, preoccupied.

The species ranges over the whole of the Caribbean lowlands (specimens from the Chiriquí Lagoon to Nicaragua), from near sea-level up to at least 2,000 feet. A single bird was taken at Cartago by Cooper, but this seems to be very unusual, since there are no other records from above 2,000 feet. The bird occurs only in the heavy virgin forest, where it is invariably found near the ground, being especially fond of creeping about on the large elevated roots so common in tropical forests. I have occasionally seen it as high up as twenty-five feet, but rarely. It is very quiet, and if it has a call I have never heard it.

390. *Sittasomus sylvioides* Lafresnaye.

*Sittasomus olivaceus* (not of Wied) ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 133 (Dota and Monte Redondo).

*Sittosomus olivaceus* SCLATER, Cat. Birds Brit. Mus., XV, 1890, 119 (Tempate, Costa Rica [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 176 (Costa Rican references).

*Sittosomus sylvioides* LAFRESNAYE, Rev. Zool., 1849, 331 (Mexico). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (Dota [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Costa Rica). — RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 509 (Costa Rica). — UNDERWOOD, Ibis, 1896, 440 (Miravalles). U. S. Nat. Museum: Guayábo and Bonilla (Ridgway and Zeledón), Santa Maria de Dota (Basulto), Monte Redondo (Alfaro), Cedral de Asserí (Underwood).

Bangs Collection: Bolson, Tenorio, Cedral de Asserí, Coralillo, Cerro de Santa Maria (Underwood).

Carnegie Museum: Miravalles (Carriker). Four skins.

The range of this bird covers the whole of the highlands, from about 2,000 feet up to 5,000 feet, and the Pacific slope from the Gulf of Nicoya northward, down to at least 1,000 feet, perhaps lower. It is found in the heavy forest and has habits very similar to *Glyphorhynchus cuneatus*.

### 391. *Deconychura typica* Cherrie.

*Deconychura typica* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 339 (Pózo Azul de Pirrís, Sept. 7, 1889 [J. Zeledón]; coll. U. S. Nat. Mus.); Expl. Zool. en C. R., 1891-2, 1893, 39 (Palmár, one specimen).

U. S. Nat. Museum: Pózo Pital (Cherrie), Pózo Azul de Pirrís (type?).

Bangs Collection: Pózo Azul de Pirrís, and El General de Térraba (Underwood). Two skins.

Carnegie Museum: El Pózo de Térraba (Carriker). Three skins.

This peculiar type of tree-creeper is found only in southwestern Costa Rica, from Pózo Azul southward, and in western Chiriquí, from sea-level up to not more than 1,000 feet, and most abundantly below 500 feet. I found it to be an inhabitant of the heavy dark forest along the banks of the lower portion of the Rio Grande de Térraba, solitary, and resembling in its habits *Xiphorhynchus* or *Picolaptes*.

### 392. *Xiphorhynchus nanus costaricensis* (Ridgway).

*Dendroornis nana* LAWRENCE, Ibis, 1863, 181 (Lion Hill, Panama). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 180, *part* (Costa Rican references). — UNDERWOOD, Ibis, 1896, 440 (Miravalles, rare).

*Dendroornis pardalotus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (Tucurríqui, Costa Rica [Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica).

*Dendroornis susurrans* BOUCARD, P. Z. S., 1878, 60 (San Carlos). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 133, *part* (Angostura [Carmiol]).



*Dendrornis lawrencii costaricensis* RIDGWAY, Proc. U. S. Nat. Mus., X, 1887, 510 (Tucurríqui [Carmioli]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Costa Rica).

*Dendrornis nana (costaricensis* Ridgw. ?) CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 40 (Palmár, Boruca, Lagarto, Térraba, and Buenos Aires).

*Dendrornis nana costaricensis* BANGS, Auk, XXIV, 1907, 299 (Boruca, Paso Real, El Pózo, and Barránca de Térraba [Underwood]).

*Dendrornis* = *Xiphorhynchus* OBERHOLSER, Smithsonian Miscel. Coll., vol. 48, 1905, 59.

U. S. Nat. Museum: Jiménez (Alfaro and Carranza), Bonilla (Alfaro and Ridgway), Concepcion de Jiménez (Cherrie); Bebedero (—?).

Bangs Collection: El General de Térraba, Pózo Azul de Pirris, Tenorio, Limon (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guácimo and Guápiles (Carriker & Crawford); Pózo Azul de Pirris, Guácimo, Cuábres, Rio Sicsola, El Hogar, El Pózo de Térraba, Buenos Aires (Carriker). Twenty-nine skins.

The most abundant and widely distributed of the family in Costa Rica, with the single exception of *Picolaptes c. compressus*. Its range covers the whole of the Caribbean and Pacific lowlands from sea-level up to about 2,500 feet on the Caribbean side and 2,000 on the Pacific. It is found in the heavy forest and to a great extent in the more open woodland, especially on the Pacific side. I found it more abundant in the Térraba Valley than in any other part of Costa Rica I visited.

### 393. *Xiphorhynchus punctigula* Ridgway.

*Dendrornis erythropygia* LAWRENCE (not of Sclater), Ann. Lyc. N. Y., IX, 1868, 107 (Angostura and Pacuare [J. Carmiol], Barránca [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Candelaria, Barránca, Pacuare and Tucurríqui). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 414 (Rio Súcio [Cooper]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 131 (Angostura [Carmioli]).

*Dendrornis punctigula* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 545 (Naránjo, Aug., 1866 [Cooper]; coll. U. S. Nat. Mus.; also Tucurríqui [Zeledón]). — ELLIOT, Auk, VII, 1890, 188 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 182 (Costa Rican references).

*Dendrornis* = *Xiphorhynchus* OBERHOLSER, Smithsonian Miscel. Coll., vol. 48, 1905, 59.

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), La Lagunaria and El Rey de Dota (Basulto), Reventazón (Carranza), Bonilla (Zeledón); San Carlos.

Bangs Collection: Carrillo, Tenorio, La Vijagua, La Hondura, El General de Térraba (Underwood).

Carnegie Museum: La Hondura, Carrillo, Juan Viñas, El Hogar (Carriker). Cariblanco de Sarapiquí and Carrillo (Underwood). Thirty-seven skins.

This is an abundant species throughout its range, which covers the whole of the Caribbean slope from 1,000 feet up to about 5,000 feet, the higher portions of the Dota Mountains, and both sides of the main Cordillera in northwestern Costa Rica. It is found in abundance wherever there is sufficient rainfall to keep the forest damp and cool, not occurring in the greater part of the plateau region and Pacific slope, which have for six months a dry season. It is a typical *Xiphorhynchus* in its habits, climbing up the tree-trunks and limbs in the spiral manner common to the family, and after arriving at a height of fifty to sixty feet flying off to the foot of another tree, where the same operation is repeated.

394. *Xiphorhynchus lacrymosus eximius* (Hellmayr).

*Dendrornis lacrymosa* LAWRENCE, Ann. Lyc. N. Y., VII, 1862, 467 (Panama).

— ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Pacuare and Las Tiojas).

— SCIATER, Cat. Birds Brit. Mus., XV, 1890, 133, *part* (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 182, *part* (Costa Rican references). — ELLIOT, Auk, VII, 1890, 181 (Costa Rica).

— UNDERWOOD, Ibis, 1896, 440 (Miravalles).

*Dendrornis lacrymosa eximia* HELLMAYR, Jour. für Ornith., 1903, 537 and 538 (Costa Rica and Veragua). — BANGS, Auk, XXIV, 1907, 299 (El Pózo de Terraba).

*Dendrornis* = *Xiphorhynchus* OBERHOLSER, Smithsonian Miscel. Coll., vol. 48, 1905, 59.

U. S. Nat. Museum: Bonilla (Zeledón), Reventazón (Carranza), Pózo Azul de Pirris (—?).

Bangs Collection: Pózo Azul de Pirris, La Vijagua (Underwood).

C. H. Lankester Collection: Guácimo.

Field Museum: El Pózo de Terraba (Carriker).

Carnegie Museum: Cuábre, Rio Sicsola, El Hogar, Pózo Azul de Pirris (Carriker); Reventazón (Underwood). Eight skins.

Sparsely distributed over the entire Caribbean lowlands from sea-level up to about 1,000 feet, and in the Pacific lowlands from the Rio Grande de Pirris southwards. I found it to be more abundant in the Sicsola Valley than at any other point visited, but it was by no means common there. I once saw a pair of them on the Rio Sicsola, chattering most excitedly and taking turns at pecking at something in a knot-hole on the side of a tree-trunk, about forty feet from the

ground. Curious to find out the cause of their excitement I quietly watched them for about five minutes, when to my astonishment a small poisonous snake fell to the ground out of the hole at which they were pecking.

395. *Xiphocolaptes emigrans costaricensis* Ridgway.

*Xiphocolaptes emigrans* SCLATER and SALVIN, Ibis, 1859, 118 (Guatemala). — RIDGWAY, Proc. U. S. Nat. Mus., XVII, 1889, 8 (Naránjo de Cartago, 1886 [José Zeledón]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 145, *part* (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 183 (Costa Rican references).

*Xiphocolaptes emigrans costaricensis* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 541 and XII, 1889, 8 (Naránjo de Cartago [Zeledón]; coll. U. S. Nat. Mus.).

U. S. Nat. Museum: Juan Viñas (Zeledón) (Carranza). Two skins.

Bangs Collection: Azahár de Cartago (Underwood). One skin.

C. H. Lankester Collection: Cachí, August 6, 1908. One specimen.

Carnegie Museum: Juan Viñas, March 15, 1902, ♀ (Carriker).

One of the rarest of the Costa Rican *Dendrocolaptidæ*, of which there are not more than a half-dozen skins in existence, of which I can find any record. Three out of the five skins in the United States came from Juan Viñas, and the other two at no great distance from that point. The bird is probably found only in the mountains or rather in the plateau district, and only on the Caribbean slope. Nothing is known of its habits, more than that it is an inhabitant of the forest, and feeds after the manner of all true *Dendrocolaptine* birds.

396. *Picolaptes affinis neglectus* Ridgway.

*Dendrocolaptes affinis* LAFRESNAYE, Rev. Zool., 1839, 100 (Mexico).

*Picolaptes affinis* LAFRESNAYE, Rev. Zool., 1850, 275. — LAWRENCE, Ann. Lyc. N. Y., I X, 1868, 107 (San José and Dota [J. Carmiol], Barránca [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 497 (Volcan de Irazú [Nutting]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 149 (San José [Carmiol], San Francisco de Irazú [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 185 (Costa Rican references).

*Thripobrotus affinis* CABANIS, Jour. für Orn., 1861, 242 (Costa Rica [Frantzius]).

*Picolaptes affinis neglectus* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 73 (type from Coliblanco, Costa Rica, May 6, 1905 [R. Ridgway]; coll. U. S. Nat. Mus.).

U. S. Nat. Museum: Volcan de Turrialba, Guayábo (Ridgway and Zeledón), Las Vueltas, El Rey, La Lagunaria, El Copey, and Santa Maria de Dota (Basulto).

Bangs Collection : Volcan de Irazú and La Estrella de Cartago (Underwood).

C. H. Lankester Collection : Volcan de Póas.

Carnegie Museum : Volcan de Irazú, Volcan de Turrialba, Juan Viñas, Ujurras de Térraba (Carriker) ; Tobósi (Francisco Ulloa Cooper). Ten skins.

Confined to the highlands and high mountains, extending downward in small numbers on the Caribbean slope to 2,500 feet. It is most abundant on the high volcanoes and in the higher portions of the Dota Mountains and the Cordillera de Talamanca. Its range overlaps slightly that of *P. c. compressus* on the Caribbean slope, but there is a considerable gap between the two on the Pacific side. It is found only in the heavy virgin forest.

### 397. *Picolaptes compressus compressus* (Cabanis).

*Picolaptes lineaticeps* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 ("Gulf of Nicoya" [Arcé]; coll. O. Salvin).

*Thripobrotus compressus* CABANIS, Jour. für Orn., 1861, 243 (Costa Rica [Ellendorff]; coll. Berlin Museum).

*Picolaptes compressus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 107 (Costa Rica). — SALVIN, Ibis, 1869, 314 (Costa Rica). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica). — BOUCARD, P. Z. S., 1878, 60 (Navárra). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 397 (La Palma de Nicoya). — ZELEDÓN, An. Mus., Nac. de C. R., I, 1887, 114 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 153 (Bebedéro [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 186 (Costa Rican references). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 534 (Mojica [Alfaro and Cherrie]; Bebedéro, Guayábal, and Pózo Azul de Pirrís [Underwood]; Jiménez [Alfaro]; Talamanca [Alfaro, Carranza, and Dr. King]); Expl. Zool. en C. R., 1891-2, 1893, 40 (Boruca and Buenos Aires). — RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 475 (Bahia de Salinas [Alfaro], critical). — UNDERWOOD, Ibis, 1896, 440 (Miravalles).

*Picolaptes gracilis* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 542 (Monte Redondo [Alfaro]; coll. U. S. Nat. Mus.).

*Picolaptes compressus compressus* BANGS, Auk, XXIV, 1907, 299 (Boruca, Paso Real, and Barránca de Térraba; Barránca de Puntarenas [Underwood]).

U. S. Nat. Museum : Guayábo and Pígres (Ridgway and Zeledón), Bonilla (Basulto) (Alfaro), Pózo Azul and Guayábo (Underwood).

Bangs Collection : Tenorio, Bolson, Bebedéro, Coralillo, Pózo Azul de Pirrís and El General de Térraba (Underwood).

Carnegie Museum : Guápiles (Carriker & Crawford); Pózo Azul de Pirrís, Bebedéro, Guápiles, Miravalles, Bagáces, El Pózo de Térraba,

El Hogar, Juan Viñas, Buenos Aires, Boruca (Carriker). Eighteen skins.

The range of this common tree-creeper extends over the whole of the Caribbean lowlands and up the mountain slopes to about 3,000 feet, slightly overlapping the range of the mountain species, *P. affinis neglectus*; on the Pacific side it is found over the whole of the lowland country and into the foothills to an altitude of scarcely more than 1,500 feet. It is, comparatively speaking, an abundant bird wherever found. There are no species of *Dendrocolaptidae* very abundant in individuals, at least not in Costa Rica, their increase beyond a certain point being prevented by some natural cause, probably lack of proper food. This species is found in open woodland and scattered clumps of trees to a considerable extent, being about the only Costa Rican species which leaves the heavy forest at all.

There can be no doubt that the type of *Picolaptes gracilis* Ridgway is an immature or abnormally colored individual of this species. Mr. Ridgway himself says that he has little doubt that this is the case (Proc. U. S. Nat. Mus., XIV, 1891, 475), and after examining the type I quite agree with his decision.

398. ***Campylorhamphus pusillus borealis*** subsp. nov.

*Xiphorhynchus pusillus* SCLATER, P. Z. S., 1860, 278 (Colombia, "Bogotá"); Cat. Birds Brit. Mus., XV, 1890, 160 (Costa Rica [Endres]). — BOUCARD, P. Z. S., 1878, 60 (Juan Viñas, one specimen). — ZELEDON, An. Mus. Nac. de C. R., I, 1887, 114 (Birrís). — CHAPMAN, Bull. Am. Mus. Nat. Hist., II, 1889, 157 (Costa Rica [Zeledón]; monogr. of genus). — CHERRIE, Auk, IX, 1892, 250 (San José, accidental visitor; one taken August 26, 1891). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 189 (Costa Rican references).

*Campylorhamphus* BERTONI, 1901 (authority of Dr. C. W. Richmond).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Jiménez (Alfaro).

Bangs Collection: Carrillo, Azáhar de Cartago, El General de Térraba, Cariblanco de Sarapiquí (Underwood). Five skins.

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles (Carriker & Crawford); Guácimo, Guápiles, La Hondura, El Hogar, Carrillo (Carriker). Nine skins.

Type, No. 28075, Carnegie Museum; adult male, El Hogar, Costa Rica, March 17, 1907; M. A. Carriker, Jr.

Similar to *C. p. pusillus* Sclater, of Colombia, but darker throughout, more olive beneath, and with the streaks on the lower parts extending

as far backward as the middle of the abdomen; the interscapular region darker and richer brown, sparingly streaked with buffy-ochraceous, while in *C. p. pusillus* the streaking is confined to the pileum and nape; crown much darker, being decidedly blackish-brown; throat and streaks on lower parts deep buffy-ochraceous, much darker than in true *pusillus*; bill dusky horn, quite blackish in young birds; toe-nails also much darker.

This curious and easily recognized species is found over the whole of the Caribbean lowlands and up the eastern slopes to at least 4,000 feet, in the southwestern Pacific lowlands in very small numbers (a single record), and occasionally a straggler in the central highlands (two records). It is most abundant in the northern part of the Caribbean lowlands, in the so-called Santa Clara Valley, and especially in the vicinity of Guácimo, El Hogar, Jiménez and Guápiles. It is found only in the heavy forest, and is almost always seen feeding on a certain species of palm, probing with its long curved bill between the clusters of nuts and between the bases of the leaf-stalks where they emerge from the crown of the tree, evidently in search of some insect which makes its home in this palm. It is a rare bird and one seldom encountered.

### 399. *Dendrocolaptes validus costaricensis* Ridgway.

*Dendrocolaptes validus* TASCHENBERG, Fauna Per., 242, pl. 21, fig. 2 (E. Peru).

*Dendrocolaptes validus* (not of Taschenberg) SCLATER, Cat. Birds Brit. Mus., XV, 1890, 172, *part.* — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 191 (Costa Rican references).

*Dendrocolaptes multistrigatus* EYTON, Contr. Orn., 1851, 75 (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (Navárrro [J. Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Costa Rica).

*Dendrocolaptes puncticollis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 146 (Costa Rican specimens not *D. multistrigatus* Eyton, but *D. puncticollis* Scl. & Salv.). — BOUCARD, P. Z. S., 1878, 60 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 114 (Cartago). — RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 545 (Navárrro [Cooper]). — SCLATER, Cat. Birds Brit. Mus., XV, 1890, 171, *part* (no Costa Rican specimens).

*Dendrocolaptes validus costaricensis* RIDGWAY, Proc. Biol. Soc. Wash., XXII, 1909, 73 (type from La Lagunaria de Dota, Costa Rica, June 4, 1908 [Francisco Basulto]; coll. U. S. Nat. Mus.).

U. S. Nat. Museum: Navárrro, Cartago, and Naránjo de Cartago (= Juan Viñas) (J. Cooper); El Rey and La Lagunaria de Dota (Basulto).

Bangs Collection: Volcan de Irazú and Rio Súcio (Underwood).

Two skins.

C. H. Lankester Collection: Cariblanco de Sarapiquí.

The proper name for this bird has long been in doubt and the synonymy is in a rather confused state, but I believe that it is now satisfactorily settled. *D. puncticollis* Sclater and Salvin is confined to northern Nicaragua and Guatemala, while *D. multistrigatus* Eyton is synonymous with it. The Costa Rican bird proves to be a northern race of *D. validus* Taschenberg, of Peru, being distinguished from that bird (compared only with birds from Santa Marta, Colombia, which are probably not typical), according to Mr. Ridgway, by having the "chest less distinctly streaked or with streaks less broken (broken along edges by black dots or bars) and under parts much more extensively barred."

It is a very rare bird everywhere, and not many specimens have been taken. It is probably confined to the highlands, between about 2,000 and 5,000 feet.

400. ***Dendrocolaptes sancti-thomæ sancti-thomæ*** (Lafresnaye).

*Dendrocolaptes sancti-thomæ* LAFRESNAYE, Rev. Zool., 1852, 466 (Santo Tomas (?), Honduras).

*Dendrocolaptes sancti-thomæ* SCLATER, P. Z. S., 1858, 96 (Mexico); Cat. Birds Brit. Mus., XV, 1890, 174 (Tucurríqui [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 305 (Aguacate Mts.). — BOUCARD, P. Z. S., 1878, 60 (Navárrro). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Pacuare and Jiménez). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 192 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 440 (Miravalles).

U. S. Nat. Museum: Bonilla (Ridgway, Zeledón and Alfaro) (Balsalto); Pígres (Ridgway); Rio Matina (Cherrie).

Bangs Collection: Cariblanco de Sarapiquí, Tenorio, Cerro de Santa Maria, Bolson, Juan Viñas, Coralillo, La Vijagua (Underwood).

C. H. Lankester Collection: Mojica, Limon, Guácimo.

Carnegie Museum: Guápiles (Carriker & Crawford); Guápiles, Cuábre, Guácimo, Miravalles, El Hogar, Bebedéro (Carriker). Fourteen skins.

This bird is distributed over the whole of Costa Rica from sea-level up to about 2,000 feet, with the exception of the Térraba Valley, where it is replaced by a local race, *D. s.-t. hesperius* Bangs. It is found in the heavy forest and has practically the same habits as *Campylorhamphus*.

401. *Dendrocolaptes sancti-thomæ hesperius* Bangs.

*Dendrocolaptes sancti-thomæ* (not of Lafresnaye). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 41 (Boruca, four specimens).

*Dendrocolaptes sancti-thomæ hesperius* BANGS, Auk, XXIV, 1907, 299 (type from Lagarto, Costa Rica, adult male; coll. E. A. and O. Bangs; collected May 27, 1906, by C. F. Underwood; additional specimens from Boruca, Paso Real, and El Pózo de Térraba).

Bangs Collection: Buenos Aires de Térraba (Underwood).

Carnegie Museum: El Pózo de Térraba (Carriker). Two skins.

This is a local race, probably confined to the Térraba Valley in Costa Rica and the northwestern portion of Chiriquí. It differs from true *sancti-thomæ* in the much finer barring of both the under and the upper parts and in the paler and duller coloring.

## Family COTINGIDÆ.

402. *Procnias tricarunculata* (J. and E. Verreaux).

*Casmorhynchus tricarunculatus* VERREAUX (J. and E.), Rev. et Mag. Zool., 1853, 193 (Boca del Toro, Panama; in the Chiriquí Lagoon).

*Chasmorhynchus tricarunculatus* CABANIS, Jour. für Orn., 1861, 253 (Costa Rica [Frantz]). — SCLATER, Cat. Amer. Birds, 1862, 258 (Costa Rica); Cat. Birds Brit. Mus., XIV, 1888, 405 (Tucurríqui [Arcé]). — SALVIN, Ibis, 1865, 90-95; crit. (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (San José, Dota, and Cervántes [J. Carmiol], Turrialba [J. Cooper]). — FRANTZ, Jour. für Orn., 1869, 310 (Costa Rica). — BOUCARD, P. Z. S., 1878, 66 (Volcan de Irazú). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 496 (Volcan de Irazú [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Naranjo de Cartago, La Candelaria, La Palma de San José, El Zarcero de Alajuela). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 142 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893 (Térraba, abundant). — BANGS, Auk, XXIV, 1907, 303 (El Pózo de Térraba [Underwood]).

*Procnias tricarunculatus* RIDGWAY, Condor, VII, 1905, 156, in text (Bonilla; critical).

*Procnias tricarunculata* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 883 (highlands of Nicaragua, Chiriquí, and Costa Rica: Tucurríqui, Dota, Cervántes, Turrialba, Bonilla, Barranca, Rancho Redondo, San Cristobal, Guápiles, Volcan de Irazú).

Bangs Collection: La Estrella and Azahár de Cartago; Turrialba, Pózo Azul de Pirris (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Guápiles (Carriker & Crawford); Volcan de Irazú, El Hogar (Carriker). Eleven specimens.



Ranges over the whole of the country, breeding at high altitudes and remaining in the highlands most of the year, but always migrating into the lowlands at a certain season. (For habits, etc., see Introduction, page 326).

#### 403. *Cephalopterus glabricollis* Gould.

*Cephalopterus glabricollis* GOULD, P. Z. S., 1850, 92, pl. 20 (Cordillera de Chiriquí, 8000 ft. alt., Panama; type in coll. Acad. Nat. Sci. Phila.). — CABANIS, Jour. für Orn., 1861, 254 (Costa Rica; brought in by Indians [Ellendorf]). — SALVIN, P. Z. S., 1867, 150 (Turrialba, Costa Rica; critical). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (Dota Mts. and Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 311 (Dota Mts.). — BOUCARD, P. Z. S., 1878, 66 (Volcan de Irazú and San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 119 (Turrialba, Naránjo de Cartago, Jiménez, Santa Maria de Dota, El Zarcéro de Alajuela). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 400 (Turrialba [Arcé and Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 145 (Costa Rican references). — RIDGWAY, Condor, VII, 1905, 156, in text (Bonilla, Costa Rica); Birds N. and Mid. Amer., IV, 1907, 878 (Chiriquí and Costa Rica: Dota Mts., Angostura, Turrialba, Volcan de Irazú up to 10,000 feet, Bonilla, Coliblanco, Guácimo, La Palma de San José, Rio Sicsola).

Bangs Collection: La Hondura and La Vijagua (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí and Guácimo.

Carnegie Museum: Guácimo, Rio Sicsola, El Hogar (Carriker).

This remarkable cotinga has the most varied range of any species of the family in Costa Rica, being found from sea-level up to 10,000 feet, wherever there are heavy forests. It is not an abundant bird, however, and but few individuals are seen. I saw a pair on the Rio Sicsola, near sea-level, and secured the female. At Guácimo I also secured a female, and close by at El Hogar secured a pair in 1907. They are always seen in the heavy forest, sometimes near the ground and again high up in the trees, and are very stupid and easy to approach.

#### 404. *Querula purpurata* (Müller).

*Muscicapa purpurata* MÜLLER, Syst. Nat. Suppl., 1776, 169 (based on *Gobe-Mouche noir a gorge pourpre de Cayenne* Daubenton, Pl. Enl., pl. 381).

*Querula cruenta* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (Angostura and Pacuare [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 310 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Angostura and Pacuare). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 396 (Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 144 (Costa Rican references).

*Querula purpurata* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 875 (Costa Rica to Lower Amazons. — Costa Rica: Angostura, Pacuare, Talamanca).

Acad. Nat. Sci. Philadelphia: Reventazón (Underwood).

Bangs Collection: Reventazón (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum Collection: Guácimo (Carriker & Crawford);  
Guácimo, El Hogar (Carriker). Fifteen specimens.

This cotinga is confined to the Caribbean lowlands and foot-hills, up to not more than 1,500 feet. It is most abundant in the immediate vicinity of Guácimo, El Hogar, and Jiménez, where I secured a fine series of specimens and saw many others. It frequents the tangled jungle peculiar to this immediate locality, where the trees are mostly low and overgrown with vines, with an occasional tall tree growing above the jungle. It is in these scattered tall trees that the birds are mostly found, and are usually seen in small flocks of from five to ten, there being usually more females than males. They have a peculiar soft, liquid, musical note, very difficult to describe, which sounds a great deal like the cooing of a dove, only much sweeter and clearer. Were it not for a curious habit which they have it would be rather difficult to collect many in that region. If a bird is wounded and held in the hand it will scream loudly and harshly, quite a different note from the usual call note, and the remainder of the flock, hearing this note, will swoop down at the person holding the wounded bird, just as terns do, and alight very near, so that usually all the birds of the flock can be secured. If this trick is not resorted to, after one bird is shot, the others quickly fly away for some distance and pursuit is impossible on account of the nature of the jungle.

405. ***Tityra semifasciata costaricensis*** Ridgway.

Native name "Pajaro Chanco."

*Tityra personata* CABANIS, Jour. für Orn., 1861, 252 (Costa Rica [Frantzius and Hoffmann]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (San José [Frantzius], Guaitíl, and Barránca [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 309 (Santa Ana and Pacaca). — BOUCARD, P. Z. S., 1878, 65 (Orósi). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 397 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 500 (San José [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Navárro, Pózo Azul de Pirrís, Naránjo de Cartago, Monte Redondo, Rio Súcio, Alajuéla, Jiménez, Las Trojas, Cartago). — CHERRIE, Auk, IX, 1892, 322 (San José; note on nest and eggs); Expl. Zool. en C. R., 1890-1, 1893, 36 (Lagarto, Boruca, Térraba, and Buenos Aires). — ALFARO, Paginas Ilustradas, I, 1904, 564 (Costa Rica; habits, descr. of nest and eggs).

*Tityra semifasciata* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 330 (Cachí

[Rogers], San José [Frantzius], Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 118 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 439 (Miravalles).

*Tityra semifasciata costaricensis* RIDGWAY, Proc. Biol. Soc. Wash., XIX, 1906, 119 (Bonilla; coll. U. S. Nat. Mus.); Birds N. and Mid. Amer., IV, 1907, 869 (southern Honduras to Panama. — Costa Rica: Jiménez, Guayabal, Pacuarito, Rio Frio, Pígres, La Palma de Nicoya, Volcan de Miravalles). — BANGS, Auk, XXIV, 1907, 303 (Boruca and Barránca de Puntarenas [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón); Bonilla (Basulto).

Bangs Collection: Juan Viñas and Bolson (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Juan Viñas, Carrillo (Carriker). Twenty-two skins.

This is perhaps the commonest of the cotingas in Costa Rica, ranging over the whole of the lowlands of both coasts and up over the central plateau region to about 6,000 feet. It seems to be most abundant at about 1,000 feet on either slope. The birds were feeding in great abundance on the tree mentioned under *Carpodectes nitidus*. The nest is made in an abandoned woodpecker's hole. I have often seen the birds entering such holes, but have never secured the eggs. Its native name of "Pajaro Chanco" is given on account of the resemblance of the note of the birds to the grunting of a pig.

#### 406. *Erator albitorques fraseri* (Kaup).

*Tityra albitorques* DU BUS, Bull. Acad. Roy. Belg., XIV, pt. ii, 1847, 104 (Peru). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (Pacuare [J. Carmiol]). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 332 (Bebedéro, Costa Rica [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 119, *part* (Costa Rican references).

*Psaris fraseri* KAUP, P. Z. S., 1851, 47, pls. 37 (male), 38 (female) (locality unknown).

*Tityra albitorques fraseri*, NUTTING, Proc. U. S. Nat. Mus., V, 1882 (La Palma de Nicoya). — BANGS, Auk, XXIV, 1907, 303 (Paso Real and El Pózo de Térraba [Underwood]).

*Tityra fraseri* CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 36 (Lagarto, one specimen).

*Erator albitorques* SUMICHRIST, Mem. Bost. Soc. Nat. Hist., I, 1869, 558 (Mexico). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 863 (southeastern Mexico to Peru. — Costa Rica: Bebedéro, La Palma de Nicoya, Pígres, Pacuare, Reventazón, Guápiles, San Bernardo, Juan Viñas, Guayabal, Bonilla).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón).

Bangs Collection: Juan Viñas, Pózo Azul de Pirris, and Bolson (Underwood).

C. H. Lankester Collection: Palo Verde.

Carnegie Museum: Guápiles (Carriker & Crawford); Guápiles, Bebedéro and El Pózo de Térraba (Carriker). Five skins.

This is a much rarer bird in Costa Rica than *Tityra semifasciata costaricensis*, although it occupies about the same range as that species, and when found is usually in company with it. I secured these two species with *Carpodectes nitidus* at Guápiles, all feeding together in the same tree. Like *Carpodectes*, it is a silent bird and does not have the peculiar rasping, grunt-like note peculiar to *Tityra*. It is a fruit-eating bird, but also eats insects.

407. ***Platypsaris aglaiae latirostris*** (Bonaparte).

*Pachyrhamphus latirostris* BONAPARTE, Compt. Rend., XXXVIII, 1854, 658 (Nicaragua [Delattre]).

*Hadrostomus aglaiae* (not *Pachyrhamphus aglaiae* Lafresnaye) CABANIS, Jour. für Orn., 1861, 252 (Lepanto, Costa Rica [Ellendorf]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (reference to record of Cabanis). — FRANTZIUS, Jour. für Orn., 1869, 309 (Costa Rica; reference to Cabanis' record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 121, *part*.

*Platypsaris latirostris* RIDGWAY, Man. N. A. Birds, 1887, 325 (Costa Rica and Nicaragua); Proc. U. S. Nat. Mus., XIV, 1891, 468, 469, 471, in text (La Palma de Nicoya).

*Platypsaris aglaiae latirostris* RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 468, in text (Nicaragua); XVI, 1893, 612 (La Palma de Nicoya); Birds N. and Mid. Amer., IV, 1907, 855 (Pacific slope of Central America; in Costa Rica: La Palma de Nicoya; Nicaragua, Salvador, and probably into Guatemala).

*Hadrostomus homochrous* (?) NUTTING, Proc. U. S. Nat. Mus., V, 1882, 397 (La Palma de Nicoya).

Bangs Collection: Bolson, several skins, Dec., 1907 (Underwood).

There are probably fewer specimens from Costa Rica of this form of *Platypsaris* than of the preceding, the only ones in the U. S. Nat. Museum being taken by Nutting at La Palma de Nicoya. Mr. Bangs has several adults of both sexes taken at Bolson by Underwood in 1907. Mr. Ridgway has placed the Cabanis record of *Hadrostomus aglaiae* under *P. a. hypophæus*, but the bird recorded by Cabanis was collected at Lepanto, which is on the western coast of the Gulf of Nicoya.

408. ***Platypsaris aglaiae hypophæus*** Ridgway.

*Hadrostomus aglaiae* (not *Pachyrhamphus aglaiae* Lafresnaye). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 335, *part* (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 121, *part* (no Costa Rican record for *hypophæus*).

*Platyptaris aglaia* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 535 (Jiménez, ♀).

*Platyptaris aglaia obscurus* RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 475 (Jiménez, Feb. 4, 1891, type, ♂; March 4, ♀ [Alfaro]).

*Platyptaris aglaia hypophæus* RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 457 (Honduras); Birds N. and Mid. Amer., IV, 1907, 854 (Atlantic slope of Central America from Honduras to Costa Rica: Jiménez).

C. H. Lankester Collection: El Hogar, Dec. 18, 1906, ♂.

Carnegie Museum: El Hogar, Dec. 28, 1906, ♀ (Carriker).

Evidently a very rare bird in Costa Rica, and thus far found only in the northeastern portion of the Caribbean lowlands, which is very likely the southernmost extent of its range. There are three skins in the U. S. National Museum from Jiménez, one ♂ and two ♀'s, collected by Alfaro and Carranza. I know of no others from Costa Rica, except the two taken at El Hogar (three miles from Jiménez) by Mr. Lankester and myself. These birds were taken in the heavy forest under about the same conditions as those under which *Pachyrhamphus cinnamomeus* is found.

#### 409. *Pachyrhamphus versicolor costaricensis* Bangs.

*Pachyrhamphus versicolor* HARTLAUB, Verz. Mus. Brem., 1844, 51. — BOUCARD, P. Z. S., 1878, 65 (La Candelaria). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 339 (Colombia and Ecuador). — SALVIN and GODMAN, Biol. Centr. Am., Aves, II, 1890, 125 (Costa Rican reference). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 535 (La Palma de San José, ♂). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 843 (Ecuador, north to Costa Rica: La Palma de San José, Volcan de Irazú, La Candelaria).

*Pachyrhamphus versicolor costaricensis* BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 26 (type, adult ♂, Volcan de Irazú [Underwood]).

Bangs Collection: Volcan de Irazú, March 4, 1890, ♀; Jan. 2, 1907, ♀; Sept. 6, 1898, ♂ (Underwood).

Fleming Collection: Rio Luisa (Underwood).

This is another of the exceedingly rare birds of Costa Rica, but six specimens ever having been taken (so far as I can determine) of which four are in the United States, three in Mr. Bangs' collection and one in the U. S. National Museum. While in Costa Rica I was shown a beautiful adult male in the possession of Señor José Zeledón. I do not know whether there are additional specimens in the Museo Nacional de Costa Rica. So far as now known, the Costa Rican range for the species covers the high mountains only, while all of the skins except one were taken on the Volcano Irazú proper, or in the moun-

tains immediately at its base. Mr. Underwood says that they are always seen high up in the trees of the forest, but nothing more is known concerning their habits.

410. ***Pachyrhampus cinnamomeus*** Lawrence.

*Pachyrhampus cinnamomeus* LAWRENCE, Ann. Lyc. N. Y., VII, 1862, 295 (Lion Hill, Panama); IX, 1868, 116 (San José, Angostura, Turrialba [J. Carmiol], Tucurríqui [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 309 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Costa Rica, two specimens without locality). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 342 (Angostura [Carmiol], Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 126 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907 (southern Mexico to eastern Peru. — Costa Rica: Angostura, Tucurríqui, Turrialba, Bonilla, Carrillo, Jiménez, Guácimo, Rio Súcio, Talamanca, Sipúrio, Pígres).

Bangs Collection: Carrillo (Underwood).

Fleming Collection: Carrillo and Cariblanco de Sarapiquí (Underwood).

C. H. Lankester Collection: Cariblanco, Tuis.

Carnegie Museum: Guácimo, Carrillo, El Hogar (Carriker). Seven specimens.

This is not an uncommon bird in the northeastern Caribbean lowlands of Costa Rica, but elsewhere it is very rare. With the exception of one bird taken by Señor Zeledón at Pígres (Pacific coast), all records are from the Caribbean lowlands and foothills, up to not more than 2,000 feet (Tucurríqui). They are found only in the heavy forest and are rarely seen anywhere except high up in the trees. I found them most abundant at El Hogar, in the heavy forest about three miles north of the railroad.

411. ***Pachyrhampus albo-griseus albo-griseus*** Sclater.

*Pachyrhampus albo-griseus* SCLATER, P. Z. S., 1857, 78 (Bogotá, Colombia).

*Pachyrhampus albogriseus* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 347, *part* (Nicaragua to Venezuela; no Costa Rica record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 128 (no Costa Rican record).

*Pachyrhampus albo-griseus albo-griseus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 836 (Nicaragua, Pacific coast; Panama, and Colombia; no Costa Rican specimens).

*Pachyrhampus ornatus* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 338 (Barranca, Costa Rica). — RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 611 (San José, Costa Rica; critical); Birds N. and Mid. Amer., IV, 1907, 842 (Costa Rica: Barranca, San José; Colombia: Valparaiso and Santa Marta).

Acad. Nat. Sci. Philadelphia: Bebedéro, Sept. 11, 1893, ♀ (Underwood).

In the Birds of North and Middle America, Mr. Ridgway states that he is of the opinion that *Pachyrhamphus ornatus* Cherrie is merely the female of *P. albo-griseus* Sclater, which opinion I likewise share, for the same reason which he gives, namely, that *P. albo-griseus* has been taken in western Nicaragua, Panama, and Colombia, but as yet has never been taken in Costa Rica, unless the female *Pachyrhamphus* described by Mr. Cherrie as *ornatus* is in reality the female of *albo-griseus*. I examined a female *Pachyrhamphus* in the collection of the Philadelphia Academy, taken at Bebedéro by Underwood, and it seems to me very probable that it is the female of the bird under discussion, *albo-griseus*. It hardly seems possible that there should be another species of *Pachyrhamphus* found within the range of *albo-griseus*, which is so closely related to it as *P. ornatus* must be to have the female resemble the female of that species so closely. After carefully considering these facts I have placed *Pachyrhamphus ornatus* Cherrie under the synonymy of *Pachyrhamphus albo-griseus albo-griseus*, and added that species to the list of authentic species of Costa Rican birds.

#### 412. *Pachyrhamphus polychropterus cinereiventris* (Sclater).

*Pachyrhamphus cinereiventris* SCLATER, Cat. Amer. Birds, 1862, 242 (Santa Marta, Colombia); Cat. Birds Brit. Mus., XIV, 1888, 344 (no Costa Rican record). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (Barránca, San Mateo, and Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 309 (Costa Rica). — BOUCARD, P. Z. S., 1878, 65 (San Mateo). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (San Mateo). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 127, pl. 43, fig. 1 (Costa Rican references). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 343 (Costa Rica; critical). — RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 611 (Jiménez, Costa Rica [Alfaro]; critical). — BANGS, Auk, XXIV, 1907, 303 (Boruca, Paso Real, and El Pózo de Térraba; Barránca de Puntarenas [Underwood]).

*Pachyrhamphus polychropterus cinereiventris* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 829 (Pacific coast of Nicaragua and Costa Rica to Santa Marta, Colombia. — Costa Rica: Angostura, Barránca, San Mateo, Guácimo, and Pózo Azul de Pirrís).

*Pachyrhamphus polychropterus similis* (Cherrie), RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 832 (Atlantic slope of Costa Rica).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Jiménez (Alfaro), San Mateo (Carmiol).

Acad. Nat. Sci. Philadelphia: Bebedéro (Underwood).

C. H. Lankester Collection: Miravalles.

Bangs Collection : Pózo Azul de Pirrís, Bolson, Juan Viñas (Underwood).

Carnegie Museum : Guácimo, Miravalles, Pózo Azul de Pirrís, Boruca, Buenos Aires, El Pózo de Térraba (Carriker). Eighteen skins.

In working over a very large series of skins of *Pachyrhamphus polychropterus* I am not able to separate the birds from the eastern and western slopes of Costa Rica as Mr. Ridgway has done. It is true there are some very slight differences between the birds from the Térraba Valley and those from northwestern and eastern Costa Rica, but they seem to me to be altogether too unstable to serve even as subspecific characters. I have examined all the material available, including skins from eastern Nicaragua, which would certainly exhibit the characters pointed out by Mr. Ridgway, if the race were separable. There are great differences in the shade of color on the underparts among birds taken in the same place (due to age, the old birds being darker), several skins from Térraba being as dark if not darker than birds from the Caribbean slope, supposed to be the dark form, *similis*; neither does the character of greater and lesser extent of gray on the rump and lower back hold good, because here again we find skins from the same place exhibiting all gradations in the extent of the gray area, while there are specimens from Boruca which exhibit the black streaking on the upper tail coverts, one of the main characters of the so-called *P. p. similis*, so that I have, after taking these facts into consideration, placed all Costa Rican references and specimens under *P. p. cinereiventris*.

This bird is found in most abundance on the Pacific slope, from sea-level up to 2,000 feet, while a few birds are found on the Caribbean slope at the same altitudes. They frequent trees along streams, open woodland, and scattered trees in pastures. They are usually seen in small flocks, although single birds or pairs are not infrequently encountered. They, like all the cotingas, are largely fruit-eaters.

#### 413. *Lathria unirufa clara* Ridgway.

*Lathria unirufa* SCLATER and SALVIN, P. Z. S., 1879, 518 (Remedios, Antioquia, Colombia). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Pacuaire). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 353, *part* (no C. R. records). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 129, *part* (no C. R. references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 37 (Lagarto and Boruca, four specimens).

*Lathria unirufa clara* RIDGWAY, Proc. Biol. Soc. Wash., XIX, 1906, 120 (Pan-



ama; coll. U. S. Nat. Mus.); Birds N. and Mid. Amer., IV, 1907, 824 (Nicaragua to northern Colombia. — Costa Rica: Pózo Azul de Pirris, Guápiles, Guácimo, Rio Sicsola, Dos Novillos, Carrillo, Jiménez, Pacuare, Reventazón). — BANGS, Auk, XXIV, 1907, 303 (El Pózo de Térraba [Underwood]).

Bangs Collection: La Vijagua, Pózo Azul de Pirris, Carrillo, El General de Térraba (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirris, El Hogar, Guácimo, Rio Sicsola, El Pózo de Térraba, Boruca (Carriker). Sixteen specimens.

The first published reference to the occurrence of this species in Costa Rica, giving definite locality, is that by Zeledón, in his Catalogue of the Birds of Costa Rica, 1887. In 1893 Mr. Cherrie records specimens from the Térraba Valley.

It is not a common bird in Costa Rica, and is confined to the lowlands of the Caribbean and the southern portion of the Pacific coast region. There are no records of the taking of specimens above an altitude of 1,500 feet. It is confined to the heavy forest, and has habits very similar in almost every respect to the following species. It has the very curious habit of calling out suddenly and loudly two or three times at the report of a gun, or when suddenly disturbed by any cause. This note is loud and clear and of a rather musical tone, and can be heard for some distance. It shows a decided preference for a peculiar hard-wood tree locally known as "Gavelon," which is abundant in the foot-hills to the south of the Santa Clara Valley.

#### 414. *Lipaugus holerythrus holerythrus* Sclater and Salvin.

*Lipaugus holerythrus* SCLATER and SALVIN, P. Z. S., 1860, 300 (Choctum, Vera Paz, Guatemala). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (Angostura [F. and J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 309 (Costa Rica). — BOUCARD, P. Z. S., 1878, 65 (San Carlos and Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Talamanca, Las Trojas, Jiménez, Naránjo de Cartago). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 357 (Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 131 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 37 (Boruca). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 508 (Rio Frio). — UNDERWOOD, Ibis, 1896, 439 (Miravalles).

*Lipaugus holerythrus holerythrus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 820 (Guatemala to northern Colombia. — Costa Rica: Angostura, Tucurríqui, Turrialba, Carrillo, Bonilla, Jiménez, Rio Frio, Cuábre, Rio Sicsola, San Carlos, Naránjo, Volcan de Miravalles, Pózo Azul de Pirris).

Bangs Collection : El General de Térraba. La Vijagua, Carrillo, Pózo Azul de Pirris (Underwood).

C. H. Lankester Collection : Guácimo.

Carnegie Museum : Pózo Azul de Pirris, El Pózo de Térraba, Boruca, El Hogar, Miravalles, Bagáces, Carrillo, Cuábres, Rio Sicsola (Carriker). Nineteen skins.

This is perhaps the most abundant of all the cotingas in Costa Rica, having a range which covers the whole of the Caribbean and Pacific lowlands up to 3,000 feet on the eastern slope and to about 1,500 feet on the western side.

It is confined entirely to the heavy forest, is very solitary in its habits, and has the habit of sitting motionless for long periods. It also catches insects on the wing like a flycatcher, darting out from its perch. The birds usually perch high up in the trees.

#### 415. *Attila citreopygus citreopygus* (Bonaparte).

*Dasycephala citreopyga* BONAPARTE, Compt. Rend., XXVIII, 1854, 657 (Nicaragua).

*Attila citreopygius* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 133, *part* (Costa Rican references).

*Attila sclateri* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (Guaitíl [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 306 (Costa Rica). — SALVIN, P. Z. S., 1867, 146 (Tucurríqui [Arcé]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Narânjo de Cartago). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 361 (Irazú District [Rogers], Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 134, *part* (?) (Costa Rican references).

*Attila citreopygus citreopygus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 805 (eastern Ecuador (?), Panama, eastern Nicaragua and eastern and southern Costa Rica: Tucurríqui, Pacuare, Guápiles, La Hondura, Guaitíl, Narânjo, Jiménez, Coliblanco, Bonilla, Irazú, Cariblanco de Sarapiquí and Pózo Azul de Pirris). — BANGS, Auk, XXIV, 1907, 303 (Boruca, and El Pózo de Térraba [Underwood]).

*Attila citreopyga luteola* RIDGWAY, Proc. Biol. Soc. Wash., XIX, 1906, 119 (San José, Costa Rica; coll. U. S. Nat. Mus.).

*Attila citreopygus luteolus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 810 (Pacific slope of Nicaragua and Costa Rica: San José). — BANGS, Auk, XXIV, 1907, 303 (El Pózo de Térraba, one ♂ [Underwood]).

U. S. Nat. Museum : Guayábo (Ridgway and Zeledón).

Bangs Collection : Pózo Azul de Pirris, El General de Térraba, Bolson, La Vijagua, Cariblanco de Sarapiquí, Carrillo, La Hondura (Underwood).

Carnegie Museum : Guápiles (Carriker & Crawford); Carrillo, La

Hondura, Bebedéro, El Hogar, Miravalles (Carriker). Seven skins.

The question of identifying the specimens of *Attila* from Costa Rica has always been a puzzling one, and unfortunately (so far as I can determine) Mr. Ridgway has only complicated matters in his treatment of the genus, at least that portion supposed to occur within the limits of Costa Rica. After the most careful study of a large series of skins of *A. citreopygus* (twenty-four from Costa Rica, eight from Panama, and one from Honduras), the only conclusion I can reach is that there is but one form of that species to be found within the limits of Costa Rica, and that *A. citreopygus luteolus* Ridgway cannot be recognized as distinct from true *citreopygus*.

This species has a very wide range in Costa Rica, covering practically the whole of the country up to at least 6,000 feet above sea-level (I saw a specimen near La Palma at not less than 6,000 feet), not only on the eastern and western slopes, but over the central plateau region as well. Among birds from the same locality, taken at the same time, will be found a great amount of variation. The young birds are much darker brown above and have a brownish breast, but even among immature birds will be found the pale phase which Mr. Ridgway has named *luteolus*, well illustrated by two skins, one from Carrillo and the other from Cariblanco de Sarapiquí (two localities with almost the same altitude and identical conditions present), in which one bird has the usual brown breast and the other a very pale one, with the remainder of the plumage corresponding. These two localities are on the Caribbean slope, low down, while the supposed range of *luteolus* is the Pacific slope. In the series examined there are five adults corresponding to the phase of plumage called *luteolus* by Mr. Ridgway, one from El Pózo de Térraba, two from Bolson, one from Miravalles, and one from La Vijagua. In all of these localities specimens were taken in the ordinary plumage of *citreopygus*, while La Vijagua is on the Caribbean watershed.

Again, *Attila citreopygus* has a continuous range from Nicaragua to Panama, so that if *A. c. luteolus* is recognized, what can be given as its range? It is found in the middle of the range of another bird only subspecifically distinct from it, and in company with that bird, which according to the definition of a subspecies, is an impossibility. Therefore, taking all these facts into consideration I do not see how it can be recognized, and have, accordingly, placed all references to it un-

der *Attila citreopygus citreopygus*, and give for the range of that bird the whole of Nicaragua, Costa Rica, and at least the northern half of Panama.

A series of eight specimens from Loma del Leon, Panama, are so constant, and differ to such a great extent from Costa Rican specimens that they may have to be separated and given a name, but I have hesitated to do so. They differ in being much smaller, especially the bill; in being very white below, except on the chest; in having the pileum and nape yellowish olive-green, scarcely streaked, except on the forehead, and in having the yellow of the rump more extended upon the back and very pale yellow, almost canary-yellow.

#### 416. *Attila tephrocephalus* Ridgway.

*Attila tephrocephalus* RIDGWAY, Proc. Biol. Soc. Wash., XIX, 1906, 118 (Talamanca, Costa Rica; coll. U. S. Nat. Mus.); Birds N. and Mid. Amer., IV, 1907, 804 (southeastern Costa Rica: Talamanca).

This species was described by Mr. Ridgway from a single specimen, and as yet no others have been taken like it. Mr. Bangs and I have both examined the type and are of the opinion that the specimen in question is only an extreme variation of *A. citreopygus citreopygus*, which is an exceedingly variable species. It seems to be the extreme gray phase, approaching which there are other specimens in the Carnegie Museum and Bangs collection.

#### 417. *Idiotriccus zeledoni* (Lawrence).

*Pogonotriccus ? zeledoni* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 144 (Dota and Barránca [F. Carmiol]).

*Pogonotriccus zeledoni* ZELEDÓN, Proc. U. S. Nat. Mus., VIII, 1885, 108. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 19 (Costa Rican references).

*Idiotriccus zeledoni* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 210 (crit.); Birds N. and Mid. Amer., IV, 1907, 797 (northwestern Panama and Costa Rica: Barránca and Dota).

Carnegie Museum: Carrillo, August 27, 1905, ♂; Las Mesas, Nov. 7, 1907, ♂ (Carriker).

This is another of the exceedingly rare birds of Central America, being confined to Costa Rica and northern Panama (so far as now known), unless the South American *Pogonotriccus ophthalmicus* Taczanowski is the same thing, as suggested by some authors. Mr. Bangs has three specimens from Chiriquí, but none from Costa Rica, and

unless they were sent to Europe (which is doubtful) Underwood has never taken the bird in Costa Rica. The only Costa Rican specimens of which I have any knowledge are the two types, collected by F. Carmiol at Barránca and Dota, and the two specimens in the collection of the Carnegie Museum (cited above). These four birds came from very widely separated regions, from 1,200 feet to at least 4,000 feet above sea-level, so that we may infer that the bird is found over the whole of the more sub-tropical portions of the country, wherever there are heavy, humid forests, but apparently in very small numbers.

#### 418. *Microtriccus brunneicapillus* (Lawrence).

*Tyrannulus brunneicapillus* LAWRENCE, Ibis, 1862, 12 (Panama); Ann. Lyc. N. Y., IX, 1868, 111 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 129 (Panama, a somewhat doubtful species). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 32 (Costa Rican reference).

*Microtriccus semiflavus brunneicapillus* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 310.

*Microtriccus brunneicapillus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 792 (Costa Rica, Panama, and northwestern Ecuador. — Costa Rica: Angostura, Jiménez). Two skins.

U. S. Nat. Museum: Jiménez, 1890 (?) (Cherrie); Feb. 11, 1891, ♀ (Underwood); July 5, 1892 (Verrill).

Bangs Collection: Jiménez, July 6, 1892 (Underwood).

Carnegie Museum: Guácimo, Dec. 24, 1903; El Hogar, March 26, 1907 (Carriker). Two skins.

Apparently confined to the lowlands of the Caribbean, below 1,500 feet. With the exception of the single specimen taken at Angostura (on the Reventazón River at about 1,500 feet) all the Costa Rican birds have been taken within a radius of not more than three miles of Jiménez, in the Santa Clara Valley, in the northeastern part of the country, and at an altitude of about 700 feet. Both of the birds which I took were secured in small semi-open spots in the forest beside little creeks. The specimen taken at El Hogar was pecking at some insect in a decayed knot-hole on the side of a small tree-trunk. It is certainly a very rare bird in Costa Rica.

#### 419. *Microtriccus semiflavus* (Sclater and Salvin).

*Tyrannulus semiflavus* SCLATER and SALVIN, P. Z. S., 1860, 300 (Choctum, Vera Paz, Guatemala; coll. Salvin and Godman). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 129 (Guatemala). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 32 (Mexico to Nicaragua).

*Microtriccus semiflavus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 791 (southern Mexico to Costa Rica: Pózo Azul de Pirris). — BANGS, Auk, XXIV, 1907, 303 (Boruca, one ♂ [Underwood]).

Bangs Collection : Pózo Azul de Pirris, two specimens ; El General de Terraba, one (Underwood).

Carnegie Museum : Boruca, ♂, July 23, 1907 (Carriker).

This *Microtriccus* is evidently confined to the Pacific lowlands in Costa Rica, its place being taken by *M. brunneicapillus* on the Caribbean side. I did not see more than one bird while in the Terraba Valley, which I secured. Underwood secured one bird at Boruca the previous year, one the same year at El General and two at Pózo Azul some time previously. I do not think there are specimens from Costa Rica in the U. S. National Museum, and probably the first specimen of the species taken in Costa Rica is the one in Mr. Bangs' collection, collected at Pózo Azul de Pirris, June, 1902, by Underwood.

#### 420. *Carpodectes antoniae* Zeledón.

*Carpodectes antoniae* "Zeledón MS.," RIDGWAY, Ibis, 5th ser., II, 1884, 27, 28, pl. 2 (Pózo Azul de Pirris; coll. U. S. Nat. Mus.); Proc. U. S. Nat. Mus., VI, 1883, 410 (Pózo Azul de Pirris, May, 1883 [Juan Zeledón]; reprint of descr.); X, 1887, 20 (descr. adult female); Condor, VII, 1905, 155, *in text* (Pígres). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Pózo Azul de Pirris). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 389 (no specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 141 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 789 (Pacific slope of western Panama and Costa Rica: Pígres, and Pózo Azul de Pirris).

Bangs Collection : Pózo Azul de Pirris. Several specimens (Underwood).

Carnegie Museum : Pózo Azul de Pirris (Carriker) ; ♂, May 20, 1902.

This beautiful species is found only in southwestern Costa Rica, south of the Rio Grande de Tárcoles (?), and has thus far been taken only in the valley of the Rio Grandé de Pirris. Neither Cherrie, Underwood, nor myself found it in the Terraba region. It is much rarer than its eastern representative, *C. nitidus*, and has a much more restricted range. The single specimen which I took at Pózo Azul de Pirris was alone, feeding in a low tree in company with some honeycreepers. I saw no others.

#### 421. *Carpodectes nitidus* Salvin.

*Carpodectes nitidus* SALVIN, P. Z. S., 1864, 583, pl. 36 (Tucurríqui, Costa Rica [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (Tucurríqui [Arcé]). —

FRANTZIUS, Jour. für Orn., 1869, 310 (Costa Rica). — BOUCARD, P. Z. S., 1878, 65 (San Carlos; descr. of female). — RIDGWAY, Proc. U. S. Nat. Mus., I, 1878, 255 (Pacuare; descr. of immature male); XI, 1888, 544 (Pacuare [Carlos Cervántes], 1876); Condor, VII, 1905, 156, in text (Bonilla). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Carrillo and Pacuare). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 389 (Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 140 (Costa Rican references). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 509 (Rio Frio). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 788 (Honduras, Nicaragua and Costa Rica (Atlantic slope): Tucurríqui, San Carlos, Pacuare, Carrillo, Bonilla, Guápiles, Guácimo, Rio Frio).

Bangs Collection: Carrillo (Underwood), Rio Frio (Richmond).

C. H. Lankester Collection: Guácimo, Limon.

Fleming Collection: Reventazón (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Guácimo, Carrillo (Carriker). Twelve skins.

Confined to the Caribbean lowlands and lower slopes up to an altitude of not more than 2,000 feet, and found only in the heavy forest. I did not see the bird in southeastern Costa Rica but I presume it occurs there, for unless found feeding, it is rarely if ever seen. I was fortunate to find a tree near Guápiles where many were feeding, in company with several other species of cotingas, and in three days I secured ten specimens. The tree was a rather isolated one in a pasture about a quarter of a mile from the heavy forest, and bore a large quantity of small purplish green, berry-like fruit, upon which the cotingas were gorging themselves. I occasionally saw a bird after that at different times in the Santa Clara Valley, but always high up in some giant forest tree.

#### 422. *Cotinga ridgwayi* Zeledón.

*Cotinga ridgwayi* "Zeledón, MS.," RIDGWAY, Proc. U. S. Nat. Mus., X, 1887, 1, pl. 6, fig. 3 (Pózo Azul de Pirrís; coll. U. S. Nat. Mus.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Pózo Azul de Pirrís). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 384 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 139 (Costa Rican reference). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 37 (Lagarto). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 783 (western Pacific slope of Panama and southwestern Costa Rica: Pózo Azul de Pirrís and Pígres).

Bangs Collection: Pózo Azul de Pirrís, Feb. 15, 1898 (Underwood).

One of the very rare birds of Central America, of which but very few specimens have ever been taken in Costa Rica. Nothing is known of its habits more than that it is confined to the heavy forests of the

Pacific lowlands from the Rio Grande de Tárcoles southward into Panama.

#### 423. *Cotinga amabilis* Gould.

*Cotinga amabilis* GOULD, P. Z. S., 1857, 64, pl. 123 (Guatemala; coll. J. Gould). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (San José (?) [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 310 (Orósi). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Naránjo de Cartago and Birris). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 384 (Costa Rica [Van Patten]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 138 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 781 (southeastern Mexico to Costa Rica: "San José," Naránjo de Cartago, Carrillo, Talamanca).

*Ampelis amabilis* CABANIS, Jour. für Orn., 1861, 253 (Costa Rica [Hoffmann]).

Bangs Collection: Carrillo (Underwood).

C. H. Lankester Collection: Tuís.

Fleming Collection: Cachí (Underwood).

This superb cotinga is confined to the Caribbean lowlands and lower slopes, up to about 2,500 or 3,000 feet. It is most abundant at about 1,000 or 1,200 feet. It is a rare bird in Costa Rica and one very seldom seen, except when it comes to certain fruit-bearing trees to feed in company with other cotingas. Nothing is known of its breeding habits. Like all the family, it is confined to the heavy forests, only coming out into the open to feed.

#### Family PIPRIDÆ.

#### 424. *Piprites griseiceps* Salvin.

*Piprites griseiceps* SALVIN, P. Z. S., 1864 (publ. April, 1865), 583 (Tucurríqui, Costa Rica [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (Tucurríqui [Arcé]). — FRANTZIUS, Jour. für Orn., 1869, 309 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 285 (type skin). — SALVIN and GODMAN, Biol. Centr.-Am., II, 1890, 107 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 768 (Costa Rica: Tucurríqui, Reventazón, and Jiménez).

Bangs Collection: Reventazón, ♂, 1892; La Vijagua, Feb. 19, ♀; March 1, 1908 (Underwood).

Field Museum: El Hogar, March 21, 1907, ♂ (Carriker).

C. H. Lankester Collection: Miravalles, June 22, 1906, one specimen.

This is the rarest of the Central American *Pipridæ*, and is found only in Costa Rica and Nicaragua. The type came from Tucurríqui, and was collected by Arcé in 1862 or 1863. Cherrie secured a male at



Jiménez, January 12, 1890, which was very probably the second specimen of the species ever taken. The only other specimens in this country are the three in Mr. Bangs' collection and the one in the Field Museum. I do not know whether Underwood ever sent any specimens of it to the Tring Museum in England or not, but it is very probable that he did not. It is confined chiefly to the lower portion of the Caribbean slopes up to about 2,000 feet, and is found only in the heavy, humid forest. Its occurrence at Miravalles is very unusual, but since the continental divide at that point is rather low, the bird very probably crossed over from the eastern slope.

#### 425. *Laniocera rufescens* (Sclater.)

*Lipaugus rufescens* SCLATER, P. Z. S., 1857, 276 (Coban, Guatemala).—SCLATER and SALVIN, Exotic Orn., pt. I, 1866, 5, 6, pl. 3. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (Barránca [F. Carmiol], Tucurríqui [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 309 (Costa Rica).

*Aulia rufescens* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Pózo Azul de Pirris). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 355 (no Costa Rican record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1891, 130 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 439 (Miravalles).

*Laniocera rufescens* RIDGWAY, Proc. U. S. Nat. Mus., X, 1888, 589 (Honduras; critical); Birds N. and Mid. Amer., IV, 1907, 765 (Guatemala to north-western Ecuador. — Costa Rica: Sipurio, Tucurríqui, Barránca, Talamanca, Bonilla, Cariblanco de Sarapiquí, and Volcan de Miravalles).

Bangs Collection: Cariblanco de Sarapiquí, Sept. 2, 1899, ♀; La Vijagua, Feb. 14 to March 8, 1908, two ♂'s and ♀ (Underwood).

This is another of the extraordinarily rare birds of Costa Rica, as well as throughout its large range. Little or nothing is known of its habits, more than that it is a bird of the forest. I was not able to secure specimens of it, nor have I ever, to my knowledge, seen it in life.

#### 426. *Scotothorus veræ-pacis* (Sclater).

*Heteropelma veræ-pacis* SCLATER, P. Z. S., 1860, 300 (Choctum, Vera Paz, Guatemala). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (Angostura and Cervantes [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 309 (Angostura, Turrialba and Tucurríqui). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Angostura and Jiménez). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 320 (Valsa and Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 116 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 36 (Palmár and Boruca). — UNDERWOOD, Ibis, 1896, 439 (Miravalles).

*Scotothorus* OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1899, 208 (new name for *Heteropelma*).

*Scotothorus veræ-pacis dumicola* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 759 (British Honduras to Chiriquí. — Costa Rica: Angostura, Cervántes, Valsa, Turrialba, Guápiles, Carrillo, Cariblanco de Sarapiquí, Jiménez, Pózo Azul de Pirrís, Volcan de Miravalles). — BANGS, Auk, XXIV, 1907, 303 (El Pózo de Térraba [Underwood]).

Bangs Collection: Cariblanco de Sarapiquí, La Vijagua, Buenos Aires, and El General de Térraba (Underwood).

C. H. Lankester Collection: Tuís.

Fleming Collection: Pózo Azul de Pirrís and Carrillo (Underwood).

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford), Pózo Azul de Pirrís, Carrillo, El Hogar, Boruca (Carriker). Eleven skins.

This manakin has a wide distribution in Costa Rica, occupying the whole of the Caribbean and Pacific lowlands and slopes up to about 2,000 feet. It is most abundant on the Caribbean slope from the Reventazón River northward along the foothills at an altitude of about 1,500 feet. It is found only in the heavy forest, and keeps on or near the ground most of the time. It has a peculiar flitting flight, hopping up suddenly and flitting off for a few yards and alighting on or very near the ground.

When Mr. Bangs separated the Chiriquí *Scotothorus* under the name of *S. veræ-pacis dumicola*, he had but three specimens of the southern bird for comparison with Mexican specimens, and these, unfortunately, were rather unusually colored birds. Since that time much material has been accumulated and it appears that the southern race is not a stable one, there being a great amount of individual variation among birds from all localities and that most of the birds in Chiriquí and Costa Rica are dark like those from Guatemala, the type locality for the species. There is, therefore, but one form of *Scotothorus veræ-pacis* in Central America, which must be known by the name here used.

#### 427. *Corapipo altera altera* (Hellmayr).

*Pipra leucorhoa* SALVIN, P. Z. S., 1867, 149 (Tucurríqui, Costa Rica; descr. of female). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116, *part* (Cervántes and Angostura). — BOUCARD, P. Z. S., 1878, 66 (Cervántes and Juan Viñas). — ZELEDON, An. Mus. Nac. de C. R., I, 1887, 118, *part* (Naránjo de Cartago and Chirripo). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 301, *part* (Angostura [Carmioll], Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 111, *part* (Costa Rican references). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 536 (description of female and young male; Costa Rica). — UNDERWOOD, Ibis, 1896, 439 (Miravalles).

*Corapipo leucorrhoa altera* HELLMAYR, Bull. Brit. Orn., Club, XVI, no. cxxiv (Carrillo, May 8, 1906 [Underwood]; Tring Museum). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 755, *part* (Panama and Costa Rica, and eastern Nicaragua. — Costa Rica: Angostura, Turrialba, Turcurríqui, Cervántes, Naránjo, Carrillo, Guápiles, Barránca, Bonilla, La Candelaria, Jiménez, Buena Vista, La Concepcion de Jiménez).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Basulto).

Bangs Collection: Carrillo, La Vijagua, Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Guácimo, Carrillo, El Hogar (Carriker). Twenty-nine skins.

When Mr. Hellmayr described this bird he made it a subspecies of *C. leucorrhoa* of Panama, giving as the distinguishing character the difference in the wing-formula. This difference is very constant, with no apparent intergradation, and in my judgment forms a specific rather than subspecific character. To strengthen this supposition I discovered that the birds of this species from southwestern Costa Rica were very distinct from those of the Caribbean slope, in the color-pattern of the throat, and with no intergradation between the two. I have therefore raised Hellmayr's subspecies to specific rank, and made the new bird a subspecies of it, the two having the same wing formula.<sup>1</sup>

*C. a. altera* is confined to the Caribbean slope, and the extreme northwestern Pacific slope in Costa Rica, the continental divide being so low at that point that it has crossed over in small numbers. It is a bird of the humid forest, scarcely ever taken below 800 feet altitude, and running upwards to at least 3,000 feet.

#### 428. *Corapipo altera albibarbis* subsp. nov.

*Pipra leucorrhoa* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116, *part* (Guaitíl [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 309 (San Mateo and Pacaca). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118, *part* (Pózo Azú

<sup>1</sup> Since writing the above, I have had the opportunity of examining five males of *Corapipo leucorrhoa* from northwestern Colombia, which when compared with specimens from eastern Costa Rica further strengthen the supposition that they are specifically distinct. The Colombian birds are decidedly metallic blue on the lower parts, especially on the sides of the body, where the blue is almost as intense as on the upper parts; also the color-pattern of the white area of the throat is slightly different, the lower edge being slightly convex, while in *C. a. altera* it is concave. The wing-pattern is the same as given by Mr. Hellmayr for the southern bird.

de Pirrís and Guaitíl). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 301, *part* (no specimen from region occupied by this race). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 111, *part* (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 36 (Palmar and Boruca).

*Corapipo leucorrhoea altera* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 755, *part* (Guaitíl). — BANGS, Auk, XXIV, 1907, 303 (Boruca, Paso Real [Underwood]).

U. S. Nat. Mus. Collection: Guaitíl (F. Carmiol).

Bangs Collection: El General and Buenos Aires de Térraba (Underwood).

Carnegie Museum: Guaitíl, Boruca (Carriker). Four skins.

Type, No. 11,273, Carnegie Museum; adult ♂, Guaitíl, Costa Rica, May 4, 1902; M. A. Carriker, Jr.

Similar to *Corapipo altera altera* (Hellmayr), except that the white on the throat is more restricted medially, and extends around farther on the sides of the neck.

In *C. altera altera* the posterior border of the white patch on the throat is nearly straight or slightly concave, and the distance from the tip of the bill to its posterior margin averages about 20 mm., while in the new form the posterior margin has the shape of an inverted V (Λ), with the distance from the tip of the bill to the apex of the Λ only 12 mm., giving it a very decided "mustache" appearance.

Two immature males have the same color-pattern as the adults.

The females differ from *C. a. altera* in being slightly more olivaceous-green above. Seven adult and two immature males and numerous females of the new form were examined and compared with a large series of *C. a. altera*.

In Costa Rica this new form is confined to the southwestern Pacific slope region, probably from the Rio Grande de Tárcoles southward, and from near sea-level up to about 3,000 feet in small numbers. It is nowhere so abundant as is its eastern representative, *C. a. altera*, in some parts of the Caribbean slope. This form extends down the Pacific slope as far as Divála, and the Volcan de Chiriquí, Panama, specimens from those localities, collected by W. W. Brown, in the collection of Mr. Bangs, being identical with Costa Rican birds.

#### 429. *Pipra pipra anthracina* Ridgway.

*Pipra leucocilla* (not of Linnæus) SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 297, *part* (no Costa Rican record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 110, *part* (no Costa Rican record). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 536 (description of female from Costa Rica).

*Pipra pipra anthracina* RIDGWAY, Proc. Biol. Soc. Wash., XIX, 1906, 117 (Moravia, Costa Rica, adult ♂, Oct. 30, 1885 [J. Cooper]).—RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 751 (Panama and southwestern Costa Rica: Moravia).

U. S. Nat. Museum: Guayábo, March 14 and 30, 1908, ♂ juv. and ♀ (Ridgway and Zeledón).

The only specimens of this form ever taken in Costa Rica, of which I have any knowledge, are those mentioned under the references to literature, and the two birds taken by Mr. Ridgway. I have never seen the bird alive and know nothing in addition to what Mr. Ridgway gives concerning it.

#### 430. *Pipra velutina* Berlepsch.

*Pipra velutina*, BERLEPSCH, Ibis, 1883, 492 (Veragua, Panama; coll. Count von Berlepsch).—SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 299 (no Costa Rican record).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 110 (no Costa Rican record).—CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 535 (Pózo Azul de Pirris, Costa Rica; critical).—HELLMAYR, Ibis, 1906, 31 (Pózo Azul de Pirris [Underwood, in Tring Mus.]; monograph).—RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 750 (southwestern Costa Rica to Ecuador.—Costa Rica: Boruca, Pózo Azul de Pirris, Pózo del Pital).—BANGS, Auk, XXIV, 1907, 303 (Boruca, Paso Real, and El Pózo de Terraba [Underwood]).

Bangs Collection: Buenos Aires and El General (Underwood).

Carnegie Museum: Pózo Azul de Pirris, El Pózo de Terraba, Boruca, and Buenos Aires (Carriker). Fifteen skins.

This *Pipra* is confined to the extreme southwestern portion of Costa Rica, from Pózo Azul de Pirris southward, and from sea-level up to about 2,000 feet. It seems to be most plentiful at about 1,200 feet. Like *P. mentalis ignifera*, this species keeps in the forest, near the ground, and makes the same cracking noise with its bill. It is, however, more solitary in its habits, and is rarely seen in company with other birds, even of its own kind. Neither are the males and females often seen in company. All males taken during July and the first part of August were undergoing the postnuptial moult, especially of the crown-feathers, which were just beginning to come in, so that no birds in full plumage were taken before late in August and September.

#### 431. *Pipra mentalis ignifera* Bangs.

*Pipra mentalis* (not of Sclater, 1856) SCLATER and SALVIN, Ibis, 1864, 362 (Panama; crit.).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (Angostura

and Tuís [J. Carmiol], Tucurríqui [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 309 (Costa Rica). — BOUCARD, P. Z. S., 1878, 66 (San Carlos). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Las Trojas, Pózo Azul de Pirrís, Tucurríqui, Pacuare). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 295, *part* (Angostura [Carmiol], Tucurríqui and Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 108, *part* (Costa Rican references). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 536 (Costa Rica; descr. of female); Expl. Zool. en C. R., 1890-1, 1893, 35 (Lagarto, Boruca, and Térraba). — UNDERWOOD, Ibis, 1896, 439 (Miravalles).

*Pipra mentalis ignifera* BANGS, Auk, XVIII, 1901, 363 (Divála, Chiriquí, Panama; type in coll. E. A. and O. Bangs). — HELLMAYR, Ibis, 1906, 15 and 3-5 (key; monogr.) — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 747 (Panama and Costa Rica: Angostura, Tucurríqui, Turrialba, Tuís, Pózo Azul de Pirrís, Pózo del Pital, Boruca, Cuábre, Talamanca, Volcan de Miravalles). — BANGS, Auk, XXIV, 1907, 303 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

Bangs Collection: Pózo Azul de Pirrís; Buenos Aires, and El General de Térraba (Underwood).

C. H. Lankester Collection: La Florida.

Carnegie Museum: Cuábre, Rio Sicsola, Boruca, El Pózo de Térraba, and Pózo Azul de Pirrís (Carriker). Twenty-nine skins.

There seems to be a slight difference between birds from the Caribbean lowlands and those from the Pacific. All specimens from the Pacific lowlands have the thighs deep yellow as in birds from British Honduras, the tail seems about the same length, but the scarlet of the pileum is darker, being about the same shade as in birds from Talamanca (Caribbean side). The Talamancan birds have the thighs paler yellow and the scarlet nuchal feather slightly longer (apparently) than those from the Pacific.

This handsome manakin is found over the lowlands of practically the whole of Costa Rica, but is most abundant in Talamanca and in the southwestern region. They are found only in the heavy forest, and prefer damp places or the borders of creeks and streams. They keep low down in the undergrowth or low limbs of the trees and are usually seen in little bands of five to eight or ten. Like most of the manakins they make a peculiar cracking sound with their bills (only the males).

#### 432. *Chiroprion linearis* (Bonaparte).

Native name "Toledo."

*Pipra linearis* BONAPARTE, P. Z. S., 1837, 113 ("Mexico").

*Chiroxiphia linearis* CABANIS, Jour. für Orn., 1861, 253 (Costa Rica [Hoffmann and Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (San Mateo

[J. Cooper], El Berilla [Zeledón], Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 309 (San Mateo and Pacaca). — BOUCARD, P. Z. S., 1878, 66 (Navárro). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 396 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 500 (locality unknown). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Las Trojas, Alajuéla, Liberia, and Monte Redondo). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 309 (Bebedéro [Arcé], Dota [Carmiol], San Juan [Frantzius], Irazú district [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 112 (Costa Rican references). — CHERRIE, Auk, IX, 1892, 322 (San José, a rare straggler). — UNDERWOOD, Ibis, 1896, 439 (Miravalles).

*Chioprion linearis* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 739 (southern Mexico to Costa Rica: San José, La Palma de San José, Tres Rios, Irazú, Dota, San Mateo, Grecia, San Juan, Sabanilla, Guaitíl, Escazú, Pózo Azul de Pirris, Pígres, La Palma de Nicoya, Bebedéro, Las Trojas, Navárro, San Carlos, La Candelaria, Alajuéla, El Berilla and Volcan de Miravalles). — BANGS, Auk, XXIV, 1907, 303 (Paso Real and Barránca de Térraba, two specimens [Underwood]).

Bangs Collection: La Candelaria, Miravalles, Sabanilla, Bagáces, Bolson, Tenorio, Cerro de Santa Maria (Underwood).

C. H. Lankester Collection: Tres Rios, Cachí, La Palma de San José, Juan Viñas.

Carnegie Museum: Esparta, Guaitíl, San Mateo, Miravalles, Bagáces, Bebedéro (Carriker). Twenty-nine skins.

This is one of the handsomest of the manakins of Costa Rica and has the most curious habits of any which I have ever seen. It is practically confined to the Pacific slope, from the coast up over the central plateau region to an altitude of perhaps 5,000 feet. It is very rare in the interior and in the Térraba Valley, being most abundant around the shores of the Gulf of Nicoya and in Guanacaste up to an elevation of about 1,500 feet. The native name for the species is "Toledo," an exact imitation of the call note of the bird. I have seen the males jump up and down on a branch, their heads down, wings half spread and feathers ruffled up, uttering at short intervals their note of "toledo" interspersed with the most curious cracking noise, produced by violently snapping the mandibles together. It frequents undergrowth in the forest and scrubby second-growth in particular, but is not seen so much in heavy dark forest.

#### 433. *Manacus aurantiacus* (Salvin).

*Chiromachæris aurantiaca* SALVIN, P. Z. S., 1870, 200 (Bugaba, Panama). — ZELEDÓN, An. Mus. Nac. de Costa Rica, I, 1887, 118 (Las Trojas, three specimens). — SCLATER, Cat. Birds, Brit. Mus., XIV, 1888, 316 (no Costa Rican

record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 115, pl. 41, figs. 1, 2 (no Costa Rican record). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 26 (Palmar, Lagarto, Boruca, Térraba, and Buenos Aires; large series). *Manacus aurantiacus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 734 (western Panama and southwestern Costa Rica: Pózo Azul de Pirrís and Las Trojas). — BANGS, Auk, XXIV, 1907, 303 (Boruca, El Pózo, Paso Real, and Lagarto de Térraba [Underwood]).

Bangs Collection: Pózo Azul de Pirrís; Buenos Aires, and El General de Térraba (Underwood).

Carnegie Museum: Pózo Azul de Pirrís; El Pózo, Boruca, and Buenos Aires de Térraba (Carriker). Twenty-four skins.

This handsome manakin is confined to the southwestern Pacific lowlands, from Las Trojas southward, but is not abundant until the region of the Rio Grande de Pirrís is reached. Even there it is not nearly so common as in the Térraba Valley, where it is one of the commonest of the birds inhabiting the low scrubby woodland so abundant in that region. It is rarely seen above 1,500 or 1,800 feet. Its favorite abode is in the low scrub along the edges of the "sabanas." I took a nest of this species at Pózo Azul de Pirrís, May 8, 1902, containing one fresh egg. The female was incubating, but would probably have laid another egg. The nest was of the vireo type, only more frail and with thinner walls. It was constructed entirely of black rootlets, very thin and frail, and hung in a horizontal fork of a small shrub about five feet from the ground, in a dense thicket. The egg is creamy-white, rather elliptical in shape and profusely speckled and blotched with lilac and purplish-red in a broad wreath about the larger end. Measurements: 17 × 12.5 mm.

#### 434. *Manacus candei* (Parzudaki).

*Pipra candei* PARZUDAKI, Rev. Zool., IV, 1841, 306 (Truxillo, Honduras).

*Manacus candei* BONAPARTE, Consp. Av., I, 1850, 171. — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 730 (southeastern Mexico to Costa Rica: Angostura, Tucurríqui, Turrialba, San Carlos, Guácimo, Guápiles, Carrillo, Jiménez, Juan Viñas).

*Chiromachæris candei* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 117 (Turrialba and Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 310 (Orósi). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 118 (Angostura, Limon, Jiménez).

*Chiromachæris candæi* BOUCARD, P. Z. S., 1878, 66 (San Carlos). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 314 (Angostura [Carmiol], Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 114 (Costa Rican references).



Bangs Collection: Carrillo and Juan Viñas (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford); Juan Viñas, Guácimo, Carrillo, El Hogar (Carriker). Twenty-four skins.

I have never seen this manakin in any part of Costa Rica except the northern portion of the Caribbean watershed, from the Matina River northward and from an altitude of about 500 feet to 2,500 feet, on the Reventazón River below Juan Viñas. They were particularly abundant in the forest north of Guácimo and El Hogar, where a fine series was secured. They have all the usual habits of the manakins, keeping near the ground, in the underbrush and low trees, and prefer tangled jungle to more open forest. When any males are in the vicinity they can always be detected by their odd habit of cracking their mandibles together, and when doing this the elongated jugular feathers are raised.

#### Family TYRANNIDÆ.

#### 435. *Muscivora tyrannus* (Linnæus).

*Muscicapa tyrannus* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 325 (Surinam).

*Milvulus tyrannus* CABANIS, Jour. für Orn., 1861, 251 (highlands of Costa Rica [Hoffmann, Frantzius, and Ellendorf]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (San José [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 309 (one of the common birds of Costa Rica).—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 496 (Irazú [Nutting]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (Cartago, Alajuela, and Las Trojas).—SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 277 (Bebedero and Tucurrique [Arcé], Irazú district [Rogers]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 104 (Costa Rican references).—CHERRIE, Auk, VII, 1890, 332 (San José from June 7 to middle of July and from Sept. 1st to Nov. 1st; absent rest of year, breeds at lower altitudes); IX, 1892, 322 (San José; note on nesting).—UNDERWOOD, Ibis, 1896, 439 (Miravalles).

*Muscivora tyrannus* FRASER, P. Z. S., 1843, 120 (Mendoza, Argentina: habits).—RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 718 (Mexico, Central and nearly whole of South America.—Costa Rica: San José, Alajuela, Volcan de Irazú, Volcan de Miravalles, Bonilla, Turrialba, Guayabal and Orósi).—BANGS, Auk, XXIV, 1907, 302 (Paso Real de Térraba [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón).

Bangs Collection: Azahár de Cartago (Underwood).

C. H. Lankester Collection: Volcan de Irazú and San José.

Carnegie Museum: Guápiles (Carriker & Crawford); Volcan de

Irazú, Juan Viñas, Buenos Aires de Térraba (Carriker). Seven skins.

The Fork-tailed Flycatcher is a common bird in many parts of Costa Rica and has a very wide distribution, being found in almost every part of the country up to 8,000 or 9,000 feet, wherever cleared lands are to be found. The habits of this bird are too well known to need further comment.

436. **Muscivora forficata** (Gmelin).

*Muscicapa forficata* GMELIN, Syst. Nat., I, 1788, 931 (based on *Gobe-mouche a queue fourchus, du Mexique*, Daubenton, Pl. Enl., pl. 677).

*Milvulus forficatus* CABANIS, Jour. für Orn., 1861, 252 (Costa Rica [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (record of Cabanis cited, *antea*). — FRANTZIUS, Jour. für Orn., 1869, 309 (one specimen obtained from Bonbecourt, shot near southern border of Costa Rica, near Chiriqui). — BOUCARD, P. Z. S., 1878, 65 (San José). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (San Mateo). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 279 (Costa Rica [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1890, 106 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 439 (Bagáces, abundant in November and December on telegraph wires; Miravalles, not common). — ALFARO, Paginas Ilustradas, I, 1904, 506 (Costa Rica; habits).

*Muscivora forficata* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 715 (southern U. S., southward during migration through Mexico and Central America to northern Panama. — Costa Rica: Gulf of Nicoya, San José, Miravalles, Pígres, and Santo Domingo de San Mateo).

Bangs Collection : Tenorio, Bolson, and Bagáces (Underwood).

C. H. Lankester Collection : Turrúcares and Ochomogo.

The Scissor-tailed Flycatcher is not so abundant in Costa Rica as the preceding, being only a winter visitor there, although present in considerable numbers at times. It is most abundant in Guanacaste, especially around the Gulf of Nicoya, and spreading from there up over the Pacific slope of the northern half of the country, as far as the valley of San José. Its habits are similar to those of the preceding species and are also well known to students of ornithology.

437. **Tyrannus melancholicus satrapa** (Cabanis and Heine).

*Tyrannus melancholicus* (not of Vieillot) CABANIS, in Schomburgk's Reis. Brit. Guiana, III, 1848. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 116 (San José and Grecia [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 308 (whole highlands). — BOUCARD, P. Z. S., 1878, 64 (San José, common everywhere). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 273, *part* (Bebedéro and Tu-

curríqui [Arcé], Irazú district [Rogers]]. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 101 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Laphytes satrapa* CABANIS and HEINE, Mus. Hein., 1859, 77 (Guiana; Caracas, Venezuela; ex *Muscicapa satrapa* Lichtenstein, manuscript, from Mexico). — CABANIS, Jour. für Orn., 1861, 251 (Costa Rica [Hoffmann, Frantz, and Ellendorf]).

*Tyrannus melancholicus* var. *satrapa* LAWRENCE, Mem. Bost. Soc. Nat. Hist., II, 1874, 288 (Mazatlan, Mexico).

*Tyrannus melancholicus satrapa* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 394 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 496 (Irazú [Nutting]). — ZELEDÓN, An. Mus., Nac. de C. R., I, 1887, 117 (Alajuela, Cartago, San José). — CHERRIE, Auk, IX, 1892, 251 (San José; notes on nesting); Expl. Zool. en C. R., 1890-1, 1893, 35 (Boruca and Buenos Aires). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 700 (western and southern Mexico, southward through Central America to Lower Amazon Valley. — Costa Rica: San José, Grecia, Barranca, Sarchí, Volcan de Irazú, Volcan de Miravalles, Santo Domingo de San Mateo, Jiménez, Alajuela, and Juan Viñas). — BANGS, Auk, XXIV, 1907, 302 (Boruca [Underwood]).

U. S. Nat. Museum: Guayabo (Ridgway and Zeledón), El Copey, and Santa Maria de Dota (Basulto).

Bangs Collection: Bolson, Cerro de Santa Maria, Juan Viñas, El General, and Buenos Aires de Terraba (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Rio Sicsola, El Hogar, Miravalles, El Pózo de Terraba, Buenos Aires, and Puntarenas (Carriker). Sixteen skins.

This is the most abundant and widely distributed flycatcher in Costa Rica, being found over the entire country up to at least 5,000 feet and perhaps higher, wherever there is cleared land or open woodland. It is never found in the forest. Its habits are very similar to those of *Tyrannus tyrannus*. The nest and eggs are also very similar, except that the nest is a much more flimsy affair. Three eggs are usually deposited.

#### 438. *Tyrannus tyrannus* (Linnæus).

*Lanius tyrannus* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 94 (based on *Muscicapa corona rubra* Catesby, Carolina, I, 55, pl. 55).

*Tyrannus tyrannus* American Ornithologists' Union Check-List, 1886, no. 444. — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 689 (temperate North America, south in winter through Mexico and Central America to Panama; no Costa Rican record). — BANGS, Auk, XXIV, 1907, 302 (El Pózo de Terraba [Underwood]).

*Tyrannus pipiri* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 267 (no Costa Rican record). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 97 (no Costa Rican record).

Bangs Collection: Los Cuádras de Irazú, Sept. 18-21 (Underwood).

Carnegie Museum: Volcan de Irazú, April 2, 1902, ♂ and ♀ (Carriker).

Two skins.

The first published record of the presence of the Kingbird in Costa Rica is that by Mr. Bangs, cited above. It would seem that there are no specimens of it in the U. S. Nat. Museum from Costa Rica, for Mr. Ridgway makes no mention of its occurrence in that country. It is not a rare bird in Costa Rica by any means, being found in the lowlands of both coasts as well as in the high interior. I frequently saw the bird perched on the telephone- and telegraph-wires along the railroad on the Old Line near El Hogar, but never collected any specimens. Its habits in the winter undergo no change, and it is the same pugnacious fighter there as on its breeding grounds.

439. *Pitangus sulphuratus derbianus* (Kaup).

*Lanius sulphuratus* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 137 (Cayenne).

*Saurophagus derbianus* KAUP, Proc. Zool. Soc. Lond., 1851, 44, pl. 36 (Zacatécas, Mexico).

*Pitangus derbianus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Santa Ana [Lopez]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Santa Ana Valley). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 394 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 500 (San José [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Las Trojas). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 175 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 43 (Costa Rican references). — CHERRIE, Auk, IX, 1892, 250 (San José, rare).

*Pitangus sulphuratus derbianus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 672 (Lower Rio Grande Valley, Texas, to Costa Rica: Santa Ana, La Palma de Nicoya, San José, Alajuéla, Bebedéro, Santo Domingo de San Mateo, Pígres, and Pózo Azul de Pirrís).

Bangs Collection: Puntarenas and Bolson (Underwood).

C. H. Lankester Collection: Alajuéla and Mojica.

Carnegie Museum: Pózo Azul de Pirrís, Rio Sicsola, Bagáces, Esparta (Carriker). Seven skins.

The Derby Flycatcher has a wide distribution in Costa Rica, covering both the Caribbean and Pacific lowlands, with the exception of the Térraba region, where it seems to be entirely wanting. It is occasionally found in the central highlands, but in small numbers, and is most abundant in the Caribbean lowlands below 1,500 feet. It is a common bird about Guápiles and along the Sicsola River, in southeastern Costa Rica. In habits, actions, note, and manner of building its nest this bird shows a

very close resemblance to *Myiozetetes*, perching on the dead limbs of tall trees, telegraph-wires, and all kinds of exposed positions, from which it catches insects on the wing. It also feeds on fruit and berries in company with *Myiozetetes*.

I noted several nests about Guápiles, which were built of grass and weed-stalks, and were of the elbow-shaped variety peculiar to some of the tyrant-birds. They were placed in the upright crotches of tall trees, always in exposed positions. I did not take any of the nests, and consequently cannot give a description of the eggs.

440. *Coryphotriccus albovittatus distinctus* Ridgway.

*Coryphotriccus albovittatus distinctus* RIDGWAY, Proc. Biol. Soc. Wash., XXI, 1908, 191 (Rio Reventazón, near Guayábo Station, March 18, 1908; Francisco Basulto).

"Similar to *C. albovittatus* (Lawrence), from line of Panama Railway, but decidedly larger; back, etc., much grayer olive; yellow of under parts paler (light canary yellow instead of lemon yellow); and blackish area on side of head much broader. Length (skin), 155 mm.; wing, 87; tail, 68; exposed culmen, 15.5; tarsus, 19; middle toe, 14."

It is certainly very curious that this bird should turn up in a region which has been collected in by many persons, and that, if it is distinct from the Panaman species, none have been taken elsewhere. But one specimen was taken by Basulto. It only emphasizes the fact that Costa Rica has one of the richest and most varied bird-faunas of any region of the world, and that in spite of all the work that has been done there, there still remains much to be done in small districts hitherto not visited.

441. *Megarynchus pitangua mexicanus* (Lafresnaye).

*Scaphorhynchus mexicanus* LAFRESNAYE, Rev. et Mag. de Zool., III, 1851, 473 (Mexico).

*Megarhynchus mexicanus* CABANIS, Jour. für Orn., 1861, 246 (highlands of Costa Rica [Frantzius and Hoffmann]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Barranca and San José [J. Carmiol]; Turrialba and Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica).

*Megarhynchus pitangua* BOUCARD, P. Z. S., 1878, 63 (San José). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 394 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 500 (San José [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Cartago, San José, Alajuela, Monte Redondo). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 189 (San José [Carmiol], Irazú district [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 51 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R.,

1890-1, 1893, 33 (Lagarto, Boruca, and Buenos Aires); Auk, IX, 1892, 251 (San José, descr. of nest and eggs). — UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Megarhynchus pitangua mexicanus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 665 (southeastern Mexico to Panama. — Costa Rica: Turrialba, Grecia, Barránca, San José, Dota, Sipúrio, El Cedral de Asserí, Carrillo, Bonilla, Jiménez, Volcan de Miravalles, San Lucas).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón); Bonilla and Santa Maria de Dota (Basulto).

Bangs Collection: Pózo Azul de Pirrís, El General de Térraba, Tenorio, Carrillo (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: (Carriker Guápiles & Crawford); San José, Escazú, Rio Sicsola, Miravalles, Buenos Aires (Carriker). Fourteen skins.

This widely distributed tyrant-bird is found in practically all parts of Costa Rica from sea-level up to 5,000 feet, but more abundantly in the lowlands and foot-hills.

Its habits are the same as those of *Pitangus* and *Myiozetetes*, and as a rule it is found in the same sort of localities. I found it very common along the Sicsola River in company with *Pitangus sulphuratus derbianus* and *Myiozetetes texensis texensis*. The birds are fond of making their nests on the broken snags in the river, wherever they project from eight to ten feet above water. The nest is constructed of grass and weed-stalks in precisely the same manner as those of *Pitangus* and *Myiozetetes*, that is, as an elbow-shaped affair, with the entrance at one end below, with the nest-cavity and eggs in the other end. They are usually about fourteen inches long and about eight inches in diameter at the larger end. The nest-cavity is lined with fine grass and feathers. The eggs are creamy-white, sparsely speckled and spotted about the larger end with chestnut and dark lilac. Measurements:  $30 \times 19.5$ ,  $29.5 \times 23$ , and  $29 \times 21$  mm.

#### 442. *Myiodynastes hemichrysus* (Cabanis).

*Hypermitres chrysocephalus* CABANIS, Jour. für Orn., 1861, 247 (Costa Rica).

*Hypermitres hemichrysus* CABANIS, Jour. für Orn., 1861, 247, *in text* (Costa Rica).

*Myiodynastes hemichrysus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Costa Rica). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 188 (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 50 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 662 (western Panama and Costa Rica: Barránca, Escazú, and Azahar de Cartago).

*Myiodynastes superciliaris* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 470 (Barránca [Carmioli]).

Bangs Collection: Azahar de Cartago, ♀ (Underwood).

One of the rarest of the flycatchers in Costa Rica, but three skins of which have ever been taken within the limits of that country. The first and type of the species was collected by either Frantzius or Hoffman, locality unknown, and is now probably in the Berlin Museum. The next was taken by J. Carmiol at Barránca, and described by Lawrence as *H. superciliaris*, while the third is one in the collection of Mr. Bangs, taken at Escazú, April 25, 1901, by Underwood (♀).

443. ***Myiodynastes maculatus nobilis*** (Sclater).

*Myiodynastes nobilis* SCLATER, P. Z. S., 1859, 42-43 (Santa Marta, Colombia). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Barránca [J. Carmiol], San Mateo [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 394 (La Palma de Nicoya). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 183 (Bebedéro [Arcé]).

*Myiodynastes audax* (not *Muscicapa audax* Gmelin) ZELEDÓN, An. Mus. Nac de C. R., I, 1887, 116 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 49 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Myiodynastes maculatus nobilis* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 659 (Costa Rica to Ecuador. — Costa Rica: Barránca, La Palma de Nicoya, Alajuela, San Mateo, San Lucas, Pígres, Bebedéro).

*Myiodynastes audax nobilis* BANGS, Auk, XXIV, 1907, 302 (Boruca [Underwood]).

Bangs Collection: Bebedéro, Bolson, Pózo Azul de Pirrís, Tenorio and Coralillo (Underwood).

Carnegie Museum: Bebedéro, Miravalles, Bagáces, El Pózo de Térraba, Boruca, Buenos Aires (Carriker). Nine skins.

This form is confined entirely to the western portion of the highlands, or central plateau region, and to the whole of the Pacific slope. It seems to be most abundant in Guanacaste, especially in the Tempisque Valley. It is also the more abundant of the two species of *Myiodynastes* in the Térraba Valley.

Its habits are the same as those of the following species.

444. ***Myiodynastes luteiventris*** Sclater.

*Myiodynastes luteiventer* CABANIS, Jour. für Orn., 1861, 250 (Highlands of Costa Rica [Hoffmann and Frantzius]).

*Myiodynastes luteiventris* SCLATER, P. Z. S., 1859, 42 (Guatemala ?). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Barránca [J. Carmiol], Turrialba [F. Carmiol], Birrís [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 308 (San Mateo, Cervantes, Barránca, Turrialba). — BOUCARD, P. Z. S., 1878, 63

(Orósi). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Naránjo de Cartago, Birris de Cartago, and Monte Redondo). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 183 (Irazú [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 48 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 33 (Térraba, one spec.); Auk, IX, 1892, 250 (San José). — UNDERWOOD, Ibis, 1896, 438 (Miravalles). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 656 (southern Arizona to Panama. — Costa Rica: Volcan de Irazú, Miravalles, Santa Rosa, Turrialba, Birris, Orósi, Cartago, Barranca, San José, Bonilla, and Coliblanco). — BANGS, Auk, XXIV, 1907, 302 (Puntarenas [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), El Copey, and Santa Maria de Dota (Basulto).

Bangs Collection: Juan Viñas, Puntarenas, Carrillo (Underwood).

Carnegie Museum: Juan Viñas, Miravalles, Boruca (Carriker). Eight skins.

This handsome species is found over a large area in Costa Rica, covering the whole of the Pacific slope and lowlands, the central plateau up to 5,000 feet, and down the Caribbean slope to about 2,000 feet. It is most abundant on the upper Caribbean slope, between 2,000 and 4,000 feet, its range on the Pacific slope being disputed by the closely allied species *M. maculatus nobilis*. In habits it is very similiar to *Pitangus*, *Myiozetetes*, and *Myiarchus*, with which it associates. It also feeds extensively on berries and small fruits when in season. I did not notice the nest of this species.

#### 445. *Myiarchus lawrencei bangsi* Nelson.

*Myiarchus lawrencii* CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 35 (Lagarto, Boruca, Térraba, and Buenos Aires, common).

*Myiarchus lawrencei bangsi* NELSON, Proc. Biol. Soc. Wash., XVII, 1904, 45 (Boquete, Panama; coll. E. A. and O. Bangs).

*Myiarchus lawrenceii bangsi* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 646 (northwestern Panama and eastern Costa Rica: Bonilla, Juan Viñas, and Tucurríqui ?). — BANGS, Auk, XXIV, 1907, 302 (Boruca, El Pózo, and Lagarto de Térraba [Underwood]).

Bangs Collection: El General and Buenos Aires de Térraba (Underwood).

Carnegie Museum: El Pózo de Térraba, Paso Real de Térraba, Boruca, and Buenos Aires (Carriker). Seven skins.

In his "Birds of North and Middle America," Mr. Ridgway gives the range of *M. l. bangsi* in Costa Rica as the eastern part of that country. I do not see how birds from Juan Viñas and Tucurríqui could be confounded with *bangsi*, for those I have examined from the Caribbean slope are all typical *nigricapillus*, the same as birds from British Honduras. *M. l.*



*bangsi* is found in Costa Rica only in the extreme southwestern portion, from Chiriquí up to the foot of the Dota Mountains at most, even the birds from Pózo Azul de Pirrís being *nigricapillus*. *M. l. bangsi* can be distinguished from *nigricapillus* by the very sooty pileum, which color is abruptly defined posteriorly.

446. ***Myiarchus lawrencei nigricapillus*** (Cabanis).

*Myiarchus lawrencei* (not *Muscicapa lawrenceii* Giraud) CABANIS, Jour. für Orn., 1861, 249 (Costa Rica [Frantzius, Hoffmann, and Ellendorf]).

*Myiarchus lawrencei* BOUCARD, P. Z. S., 1878, 64 (San José, Cartago, and Juan Viñas).

*Myiarchus lawrencii* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 115, 204 (Angostura and Sarchí [F. Carmiol], Pacuare [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — COUES, Proc. Acad. Nat. Sci. Phila., 1872, 74 *part* (Grecia, Barránca, and Angostura). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 256, *part* (Honduras). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 94 (Costa Rican references).

*M[yia; chus] nigricapillus* CABANIS, Jour. für Orn., 1861, 250, *in text* (Costa Rica).

*Myiarchus nigricapillus* SCLATER, Cat. Am. Birds, 1862, 233 (Costa Rica); Cat. Birds Brit. Mus., XIV, 1888, 257, *part* (San José and Pacuare [Carmiol], Tucurríqui [Arcé], Irazú district [Rogers]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 115 (San José [J. Carmiol], Barránca and Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica).

*Myiarchus lawrencii* var. *nigricapillus* RIDGWAY, Am. Jour. Sci. and Arts, 1872, 455, *part*.

*Myiarchus lawrencei nigricapillus* NUTTING and RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 384 (Nicaragua). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (San José, Cartago, Alajuela, Sarchí, and Las Trojas). — CHERRIE, Auk, IX, 1892, 251 (San José). — NELSON, Proc. Biol. Soc. Wash., XVII, 1904, 44, (monogr.; Costa Rica). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 644 (Honduras to Costa Rica: Guayabal, Barránca, Bebedéro, Pózo Azul, San José, Naránjo de Cartago, Cartago, Jiménez, Angostura, Grecia, Sarchí, Pacuare, Irazú, and Tucurríqui).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón); Bonilla, Santa Maria de Dota (Basulto).

Bangs Collection: Pózo Azul de Pirrís, Bolson, Tenorio, Cerro de Santa Maria, Coralillo, Guayabal, San José, and Bebedéro (Underwood).

Carnegie Museum: Bebedéro, Miravalles, Juan Viñas, Tierra Blanca, Pózo Azul de Pirrís, Cuábne, Carrillo (Carriker); Guápiles (Carriker & Crawford). Sixteen skins.

All Costa Rican specimens of *M. lawrencei* which I have been able to examine, with the exception of birds from the Térraba Valley, are *nigricapillus*, and agree with birds from British Honduras, according to the

range of the subspecies as given by Mr. Nelson, true *lawrencei* being confined to Mexico and northern Guatemala.

This is one of the commonest flycatchers in Costa Rica, covering the whole of the Caribbean lowlands and slope, the lower portions of the central plateau region, and the whole of the Pacific slope with the exception of the extreme southwestern portion, probably from the Dota Mountains southward. It is not found in the heavy forest, but in open woodland, isolated clumps of trees, gardens, and orchards.

447. ***Myiarchus ferox actiosus* Ridgway.**

*Myiarchus panamensis* (not of Lawrence, 1862) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 115 (Costa Rica). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — BOUCARD, P. Z. S., 1878, 64 (Puntarenas).

*Myiarchus ferox* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 253, *part* (in synonymy). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 92, *part* (in synonymy).

*Myiarchus ferox actiosus* RIDGWAY, Proc. Biol. Soc. Wash., XIX, 1906, 116 (Pígres, Gulf of Nicoya, Costa Rica; coll. of U. S. Nat. Mus.); Birds N. and Mid. Amer., IV, 1907, 642 (Pacific coast of Costa Rica: Pígres, San Lucas, and Puntarenas).

This form must be very scarce and local in Costa Rica, Neither Underwood nor I succeeded in securing specimens, so that practically all the skins representing it in this country are in the U. S. National Museum.

448. ***Myiarchus brachyurus* Ridgway.**

*Myiarchus nuttingi* (not of Ridgway) NUTTING, Proc. U. S. Nat. Mus., VI, 1883, 374 (San Juan del Sur, Nicaragua).

*M[yiarchus] brachyurus* RIDGWAY, Man. N. Am. Birds, 1887, 334 (Ometepe, Nicaragua; coll. U. S. Nat. Mus.). — ALLEN, Bull. Am. Mus. Nat. Hist., IV, 1892, 346, *in text* (crit.).

*Myiarchus brachyurus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 92, footnote. — NELSON, Proc. Biol. Soc. Wash., XVII, 1904, 40 (monogr.). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 34 (Costa Rica; critical).

*Myiarchus nuttingi brachyurus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 630 (southern Mexico to Costa Rica: Miravalles, San Lucas, Mojica Pacifica, Bahia de Salinas).

Bangs Collection: Miravalles, Coralillo, Bolson, Cerro de Santa Maria, Tenorio (Underwood).

Mr. Ridgway, in his "Birds of North and Middle America," (IV, p. 630), makes this form a subspecies of *M. nuttingi*, at the same time giving the ranges of the two birds as practically the same and occurring together. The form is either a good species or a synonym of *M. nuttingi*, for birds

only subspecifically distinct cannot occupy the same range, according to the definition of a subspecies.

The series of birds in Mr. Bangs' collection seems to bear out the idea that it is a distinct form, the reasons for which he gives (Proc. Biol. Soc. Wash., XXII, 1909, 34). I have also examined them and am of the same opinion.

*M. brachyurus* is found in Costa Rica only in the northwestern portion of the country, principally in the Tempisque basin and around the shores of the Gulf of Nicoya.

449. ***Myiarchus nuttingi nuttingi*** Ridgway.

*Myiarchus cinerascens* BOUCARD, P. Z. S., 1878, 64 (Puntarenas).

*Myiarchus nuttingi* RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 394 (La Palma de Nicoya, April 24, 1882. Nutting; type in coll. U. S. Nat. Mus.). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 250 (Costa Rica [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 92 (Costa Rican references). — NELSON, Proc. Biol. Soc. Wash., XVII, 1904, 37 (monogr.).

*Myiarchus nuttingi nuttingi* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 629 (southern Mexico, southward to Costa Rica: La Palma de Nicoya and Bagáces). — BANGS, Auk, XXIV, 1907, 302 (Barránca, ♂, Aug. 15 [Underwood]); Proc. Biol. Soc. Wash., XXII, 1909, 34 (Costa Rica; critical).

U. S. Nat. Museum: Mojica (Alfaro and Cherrie); San Lucas and Bahía de Salinas (Alfaro).

Bangs Collection: Bagáces, Bolson, and Tenorio (Underwood).

Carnegie Museum: Bebedéro and Puntarenas (Carriker). Four skins.

This is rather a common bird around the shores of the Gulf of Nicoya and in the lower Tempisque Valley. It frequents open woodland, isolated trees, and roadsides. It is a typical *Myiarchus* in all its habits.

450. ***Myiarchus crinitus*** (Linnæus).

[*Turdus*] *crinitus* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 170 (Carolina; based on *Muscicapa cristata, ventre luteo* Catesby, Carolina, I, 52).

*Myiarchus crinitus* LICHTENSTEIN, Nom. Av. Mus. Berol., 1854, 16. — CABANIS, Jour. für Orn., 1861, 250 (Costa Rica, one specimen [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 115 (Costa Rica [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — BOUCARD, P. Z. S., 1878, 64 (San José and Cartago). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 247 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 87 (Costa Rican reference). — CHERRIE, Auk, VII, 1890, 334 (San José, Nov. 24, 1889); IX, 1892, 251 (very rare at San José, but common on both coasts during winter). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 613 (eastern U. S., south in winter through eastern Mexico and Central America to Colombia, — Costa Rica: San José, Cartago, Bebedéro, and Pígres).

Bangs Collection: Bolson, Dec. 25; Tenorio, Feb. 7 (Underwood).

Carnegie Museum: Guápiles, March 30, 1903 (Carriker & Crawford).

A rare migrant in Costa Rica, most abundant on the Pacific coast, and rarely found in the highlands of the interior. I secured but one specimen on the Caribbean slope, at Guápiles, March 30.

451. *Sayornis nigricans amnicola* (Bangs).

? *Sayornis nigricans* (not *Tyrannula nigricans* Swainson ?) BONAPARTE, Compt. Rend., XXXVIII, 1854, 657 (Nicaragua).

*Aulax aquaticus* CABANIS, Jour. für Orn., 1861, 247 (Costa Rica [Frantzius and Hoffmann]).

*Sayornis aquatica* (not of Sclater and Salvin) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (Costa Rica [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 306 (Costa Rica). — BOUCARD, P. Z. S., 1878, 62 (San José; habits). — ZELEDÓN, An. Mus. Nac. de C. R., I., 1887, 115 (Alajuela and Navarro de Cartago). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 33, *part* (Costa Rica [Arcé and Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 65, *part* (Costa Rican references). — ALFARO, Páginas Ilustradas, I, 1904, 505 (Costa Rica; nest and habits).

*Sayornis nigricans* var. *aquaticus* BAIRD, BREWER, and RIDGWAY, Hist. N. Amer. Birds, II, 1874, 340, *part* (Costa Rica).

*Sayornis nigricans* var. *aquatica* RIDGWAY, Am. Jour. Sci. and Arts, 1872, 456, *part* (Costa Rica).

*Sayornis amnicola* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 37 (Boquete, Panama).

*Sayornis nigricans amnicola* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 601 (highlands of Costa Rica: San José, Alajuela, San Pedro, Navarro, and western Panama).

U. S. Nat. Museum: El Copey and Santa Maria de Dota (Basulto).

Bangs Collection: San José (Underwood).

Fleming Collection: San Sebastian de San José, Carrillo (Underwood).

C. H. Lankester Collection: Cachí.

The Costa Rican Phoebe is nearly as plentiful in the central highlands of that country as the North American species is in the United States, frequenting streams and cliffs and having the same habits.

I observed it at Juan Viñas, Tucurrique, and along the lower gorge of the Rio Súcio above Carrillo, but never collected any specimens.

452. *Empidonax atriceps* Salvin.

*Empidonax atriceps* SALVIN, P. Z. S., 1870, 198 (Volcan de Chiriquí, Panama [Arcé]). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 413 (Birris [Cooper]; description). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 79 (Costa Rican reference). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907,

586 (western Panama and highlands of Costa Rica: Birris, Achiote de Póas, Volcan de Irazú, Volcan de Póas, Dota Mts., Rancho Redondo).

*Mitrephanes atriceps* SCLATER, Cat. Birds Brit. Mus., XIV, 1889, 220 (Irazú district [Rogers]).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), Coliblanco (Ridgway), Las Vueltas de Dota (Basulto).

Bangs Collection: Volcan de Irazú, Rancho Redondo, Dota Mountains (Underwood).

Carnegie Museum: Volcan de Irazú, Volcan de Turrialba (Carriker). Seven skins.

This well marked species is restricted to the higher mountains of Costa Rica, and is not usually seen below 7000 feet. It is most abundant between 8,000 and 10,000 feet on the volcanoes. It is primarily a bird of the forest and many are still found there, but the majority of the birds on Irazú and Turrialba have adapted themselves to the more open wooded pastures, where they seem to be perfectly at home, perching on stumps and low limbs of trees, whence they dart out at passing insects. In their habits they more closely resemble *Myiochanes virens* than the other species of *Empidonax*, in that they sit more quietly in one favorite spot and catch passing insects. I took a nest of this species on the Volcan de Irazú, April 21, 1902, containing two fresh eggs. The nest was very similar to that of *Myiochanes virens*, but smaller, and less smoothly made. It was saddled in an upright fork of a small tree growing in the open pasture. The eggs are creamy-white, without markings. Measurements:  $17 \times 13$  and  $17 \times 13$  mm.

453. *Empidonax albigularis* Sclater and Salvin.

*Empidonax albigularis* SCLATER and SALVIN, Ibis, 1859, 122 (Duenas, Guatemala). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 223 (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 70 (Mexico, Guatemala, and Panama). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 535 (Costa Rica; one specimen, compared with skins identified by Salvin). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 584 (southern Mexico to Panama. — Costa Rica: Reventazón).

U. S. Nat. Museum: Reventazón, ♂, March 18, 1892 (Carránza); Faldas de Barba, May 12, 1889, ♂ juv. (Alfaro).

Bangs Collection: one skin without date or locality (Underwood).

This *Empidonax* is very rare in Costa Rica, nor is it abundant anywhere within its range. There are probably not more than two or three authentic skins of the species which have been taken in Costa Rica, and which I have listed above. I know nothing concerning its range or habits, but

suppose it to be found occasionally in the Caribbean lowlands as well as in the central highlands.

454. ***Empidonax flavescens*** Lawrence.

*Empidonax flavescens* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 133 (La Barranca, Costa Rica, April 1, 1864 [J. Carmiol]; type in coll. U. S. Nat. Mus.); IX, 1868, 115 (Quebrada Honda [Frantzius], Barranca and Grecia [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — BOUCARD, P. Z. S., 1878, 64 (Juan Viñas). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 413 (Cervantes [J. Cooper]). — RIDGWAY, Ibis, 1886, 467 (diagnosis). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (Dota). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 231 (Irazú [Rogers], Dota [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 75 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 583 (western Panama and uplands of Costa Rica: Barranca, Grecia, Cervantes, La Estrella de Cartago, Juan Viñas, Dota, Azahar, Coliblanco, Burgos de Irazú, La Palma de San José, Quebrada Honda, and Naránjo).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), El Copéy, La Lagunaria, and Santa Maria de Dota (Basulto).

Bangs Collection: Azahar de Cartago, Volcan de Irazú, La Estrella de Cartago, and Juan Viñas (Underwood).

Fleming Collection: Cariblanco de Sarapiquí, La Hondura, and Escazú (Underwood).

Carnegie Museum: Cartago, Volcan de Irazú, La Hondura, Juan Viñas, Ujurás de Térraba (Carriker). Eleven skins.

This handsome little species is found throughout the highlands, as a rule above 2,000 feet, but a few stragglers have been taken below that elevation on the Caribbean slope. It is not common above 7,000 feet, not being found in company with the mountain species, *E. atriceps*. It has also been found in the Dota Mountains, but was not taken by Underwood in the mountains of extreme northern Costa Rican or in the Cerro de Santa Maria. It is a woodland species, inhabiting only the heavy virgin forest, where it is always seen in the low trees and shrubbery. The birds are very tame and unsuspecting, permitting themselves to be approached closely without showing signs of fear.

I took one nest of this bird at Juan Viñas, May 8, 1907, containing three fresh eggs. The nest was constructed almost entirely of moss, and lined with fine fibres of weeds. It was placed on the broken and jagged end of a fallen tree, about ten feet from the ground, in the midst of the forest. The eggs are rich cream-color, thickly speckled and blotched with light chestnut-rufous about the larger end, and sparingly over the remaining surface. Measurements: 19×14, 19×14, and 19×14 mm.

455. *Empidonax trailli alnorum* Brewster.

*Empidonax trailli* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Dota [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica) (?).

*Empidonax traillii alnorum* BREWSTER, Auk, XII, 1895, 161 (Upton, Maine, U. S. A.). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 558 (northeastern U. S., south in winter through Central America to Ecuador. — Costa Rica: Dota, Talamanca, Juan Viñas, and Pózo Azul de Pirris).

Bangs Collection: Boruca, April 27 to May 15, 1906; Buenos Aires, May 22, 1908; Pózo Azul de Pirris, May 31, 1902; Juan Viñas, May 4; Bolson, Dec. 13, 1907 (Underwood).

Fleming Collection: Carrillo, Oct. 15, 1898, and May 4, 1899 (Underwood).

Carnegie Museum: Rio Sicsola, ♀, Sept. 4, 1904; Juan Viñas, May 10, 1907 (Carriker). Two skins.

Taken with the following form in about the same localities and on the same dates. Fairly common at times, but not long, as some seem to remain and others drift off farther south.

456. *Empidonax trailli trailli* (Audubon).

*Muscicapa traillii* AUDUBON, Orn. Biogr., I, 1832, 236 (Arkansas, U. S. A., types in U. S. Nat. Mus.).

*Empidonax trailli* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Dota [F. Carmiol]). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 226 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 71 (Costa Rican reference).

*Empidonax traillii traillii* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 555 (western North America, south in winter to Colombia. — Costa Rica: Pózo Azul de Pirris). — BANGS, Auk, XXIV, 1907, 302 (Boruca, two ♂'s, April 28, and El Pózo de Terraba, ♂, Aug. 15, 1906, Underwood).

Acad. Nat. Sci. Philadelphia: Miravalles, Sept. 16, 1895 (Underwood).

Bangs Collection: Pózo Azul de Pirris, May 2; Bolson, Dec. 10 to 24, 1907 (Underwood).

Carnegie Museum: Rio Sicsola, ♀, Sept. 24, 1904; Juan Viñas, ♂, May 10, 1907 (Carriker).

A winter visitor over the whole of the country, but perhaps not found above 4,000 feet.

457. *Empidonax virescens* (Vieillot).

*Platyrrhynchus virescens* VIEILLOT, Nouv. Dict. d'Hist. Nat., XXVII, 1818, 22 (based on *Muscicapa querula* Wilson, Amer. Orn., II, 1810, 77, pl. 13, fig. 2, not *M. querula* Vieillot, 1807).

*Empidonax acadicus* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 228 (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889,

70 (Costa Rican reference). — CHERRIE, Auk, VII, 1890, 344 (San José, two specimens, Sept. 17 and Oct. 4, 1889).

*Empidonax virescens* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 552 (eastern U. S., south in winter through Central America to Ecuador. — Costa Rica: San José).

A rare winter visitor, probably found only in the highlands. Mr. Cherrie reported it as fairly common about San José in May, 1890, but there must have been an unusually large flight there that year, for it is not a common bird in Costa Rica by any means, very few specimens of it ever having been taken.

#### 458. *Empidonax flaviventris* (Baird).

*Tyrannula flaviventris* BAIRD (Wm. M. and S. F.), Proc. Acad. Nat. Sci. Phila., I, 1843, 283 (Carlisle, Pennsylvania, type now in U. S. Nat. Mus.).

*Empidonax flaviventris* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Grecia [J. Carmiol], Navárrro [J. Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (Grecia and Pózo Azul de Pirrís). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 230 (Angostura [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 73 (Costa Rican references). — CHERRIE, Auk, VII, 1890, 334 (San José, Oct. 27, 1889); IX, 1892, 251 (rare at San José, only Sept. and Oct.); Expl. Zool. en C. R., 1890-I, 1893, 34 (Lagarto, Boruca, Buenos Aires, and Terraba). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 549 (eastern North America, south in winter through Central America to Colombia. — Costa Rica: San José, Navárrro, Angostura, Grecia, Pózo Azul de Pirrís). — BANGS, Auk, XXIV, 1907, 302 (Boruca and El Pózo de Terraba, April 9 to May 9, 1906 [Underwood]).

U. S. Nat. Museum: Guayábo, March 12 to 31, 1908 (Ridgway and Zeledón), Bonilla, April 11, 1908 (Basulto).

Bangs Collection: San José, Oct. 7; El Pózo de Terraba, April 9 to 15; Pozó Azul de Pirrís, Feb. 17; Tenorio, Feb. 7; La Vijagua, Feb. 24; Bolson, Dec. 14 (Underwood).

Fleming Collection: Carrillo, October; Pózo Azul de Pirrís, February (Underwood).

C. H. Lankester Collection: Cachí, Nov. 1, 1908.

Carnegie Museum: Guápiles, March 4; Volcan de Turrialba, 2,000 feet, April 22 (Carriker & Crawford); Juan Viñas, March 11; April 12 and 22; Guápiles, Jan. 11; Bebedéro, April 30; El Hogar, Nov. 23, Jan. 19, Feb. 10; Peralta, Nov. 9 and 12 (Carriker). Twelve skins.

This is by far the most abundant *Empidonax* wintering in Costa Rica, being found in almost all portions of the country up to 4,000 feet, but most commonly on the Caribbean watershed between sea-level and 3,000 feet.



It is usually found in thick shrubbery along river banks or beside creeks in the open woodland.

459. **Myiophobus fasciatus furfurosus** (Thayer and Bangs).

*Myiophobus naevius furfurosus* THAYER and BANGS, Bull. Mus. Comp. Zool. XLVI, 1905, 152 (Saboga Island, Bay of Panama; coll. E. A. and O. Bangs).

*Myiophobus fasciatus furfurosus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 543 (Panama). — CARRIKER, Ann. Carnegie Mus., IV, 1908, 302 (Buenos Aires de Térraba, Costa Rica [Carriker]). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 33 (El General de Térraba [Underwood]).

Bangs Collection: El General de Térraba, ♀ juv. (Underwood).

Carnegie Museum: Buenos Aires de Térraba, one adult ♂, Sept. 2, 1907.

The specimen collected at Buenos Aires, Sept. 2, 1907, is the first record for this Panaman species in Costa Rica. Underwood took a nestling at El General de Térraba the following year. It appears to be only a very rare straggler in the extreme southwestern portion of the country.

460. **Myiochanes brachytarsus** (Sclater).

*Empidonax brachytarsus* SCLATER, Ibis, 1859, 441 (Cordova, Mexico).

*Contopus brachytarsus* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 240 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 87 (no Costa Rican reference). — CHERRIE, Auk, IX, 1892, 251 (San José, Aug. 27 and Oct. 2, a rare bird in Costa Rica).

*Myiochanes brachytarsus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 526 (southeastern Mexico, southward through Central and South America to Argentina. — Costa Rica: San José, Rio Frio, Bebedéro, Cariblanco de Sarapiquí).

Bangs Collection: Cariblanco de Sarapiquí; Aug. 2-10; Bolson, Dec. 17 (Underwood).

Carnegie Museum: Guápiles, March 10-28 (three specimens) (Carriker & Crawford); Miravalles, May 23; Esparta, June 4; Buenos Aires de Térraba, Aug. 28 (Carriker). Six skins.

This species is also very rare in Costa Rica, but is distributed over the whole lowland region and some parts of the central plateau, at least up to 4,000 feet. It is found in open woodland, hedge-rows, and isolated clumps of trees.

461. **Myiochanes richardsoni sordidulus** (Sclater).

*Contopus sordidulus* SCLATER, P. Z. S., 1859, 43 (southern Mexico and Guatemala; type locality not specified).

*Myiochanes richardsonii sordidulus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 525 (southern Mexico to Panama. — Costa Rica: Coliblanco, Cedral

de Asserí, San José, and Carrillo).— BANGS, Auk, XXIV, 1907, 302 (Boruca, five specimens, May [Underwood]).

U. S. Nat. Museum: Santa Maria de Dota, May (Basulto).

Bangs Collection: Carrillo, Sept. 12; San José, Oct. 14; San Pedro, Oct. 15 (Underwood).

Fleming Collection: Juan Viñas, August (Underwood).

Carnegie Museum: Volcan de Turrialba, Buenos Aires, El Hogar, La Hondura. Seven skins.

This species is evidently not a migrant in Costa Rica, remaining there the year round and breeding. It is not a common bird anywhere, but is most abundant on the Pacific lowlands or rather in the foothills, especially in the Térraba region.

In habits it is very similar to the Wood Pewee, and around Boruca it was found in the scrubby growth along the edges of the "sabanas" or along small creeks in the hills.

462. *Myiochanes richardsoni richardsoni* (Swainson).

*Tyrannula richardsonii* SWAINSON, Fauna Bor.-Am., II, 1831, 146, pl. 46, lower fig. (Cumberland House, Saskatchewan, Canada).

*Contopus richardsonii* CHERRIE, Auk, VII, 1890, 334 (San José, Oct. 27); IX, 1892, 251 (arrives later and leaves earlier than *C. virens*); Expl. Zool. en C. R., 1890-1, 1893, 34 (Buenos Aires de Térraba).

*Contopus richardsoni* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 115 (San José [Frantzius], Frailes [J. Carmiol], Barránca [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 239 (Irazú district [Rogers], San José [Frantzius]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 85 (Costa Rican references).

*Myiochanes richardsonii richardsonii* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 521 (western North America, south in winter through Mexico and Central America, to northern Bolivia).

Bangs Collection: La Cedral de Asserí, Sept. 8; San José, Oct. 7 (Underwood).

Fleming Collection: Carrillo, Oct. and Nov.; San José, Oct. (Underwood).

Carnegie Museum: Volcan de Irazú, Apr. 3; La Hondura, Sept. 25 to Oct. 1; Volcan de Turrialba, Oct. 21 (Carriker). Four skins.

This species has about the same range in Costa Rica as the following, *M. virens*, but is more frequently met at high altitudes in company with *Nuttallornis borealis*. It is also found in the thick forest more frequently than *M. virens*. Mr. Cherrie says that it arrives later and leaves sooner than *M. virens*, but my experience does not lead to that conclusion, and I think it both arrives and departs at about the same time.

463. *Myiochanes virens* (Linnæus).

[*Muscicapa*] *virens* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 327.

*Contopus virens* CABANIS, Jour. für Orn., 1861, 248 (Costa Rica [Hoffmann]).

— LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 115 (Costa Rica; citation of Cabanis' record, *antea.*). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — BOUCARD, P. Z. S., 1878, 64 (Cartago, April). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (San José, Jiménez). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 238 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 84 (Costa Rican references). — CHERRIE, Auk, VII, 1890, 334 (San José, Aug. 21 and April 11); IX, 1892, 251 (San José, common from Aug. 20 to Apr. 29).

*Myiochanes virens* RIDGWAY, Birds, N. and Mid. Amer., IV, 1907, 518 (eastern North America, south in winter through Central America to Peru. — Costa Rica: Barránca, San José, Cartago, and Jiménez).

Bangs Collection: Jiménez, April (Underwood).

C. H. Lankester Collection: Ochomógo.

Fleming Collection: La Estrella de Cartago, April 3 (Underwood).

Carnegie Museum: Guápiles, March 21 (Carriker & Crawford); Tierra Blanca, April 11; Rio Sicsola, Sept. 12 and 23 (Carriker). Five skins.

A common winter visitor over the whole of Costa Rica up to at least 6,000 feet, and perhaps higher. It arrives very early in the autumn (about August 20) and stays until late in the spring (May 1), spending by far the greater portion of the year in the tropics, returning to the breeding grounds for only about three months in the summer.

464. *Myiochanes ochraceus* (Sclater and Salvin).

*Contopus ochraceus* SCLATER and SALVIN, P. Z. S., 1859, 419 (Costa Rica [J. Carmiol]). — SALVIN, Ibis, 1870, 115 (Costa Rica [Carmiol]); 1874, 313. — RIDGWAY, Ibis, 1884, 401 (crit.). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 237 (Costa Rica, type). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 84 (Costa Rican reference).

*Myiochanes ochraceus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 517 (high mountains of Costa Rica: Volcan de Irazú, Volcan de Turrialba).

Bangs Collection: Volcan de Irazú (Underwood).

C. H. Lankester Collection: Volcan de Turrialba, June 4, 1907.

Carnegie Museum: Volcan de Irazú (Carriker). One skin.

This species has thus far been taken only on the Volcanoes Irazú and Turrialba at high altitudes. It is not common, and until very lately was scarcely known except from the type in the British Museum. It inhabits the forest, and has the habits of the genus, so far as is known.

465. **Myiochanes lugubris** (Lawrence).

*Contopus lugubris* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 134 (Dota, [J. Carmiol]; in coll. U. S. Nat. Mus.); IX, 1868, 115 (Barránca, Pirrís, and Dota [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 208 (Costa Rica). — SALVIN, Ibis, 1874, 310 (crit.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (Birrís de Cartago). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 236 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 83 (Costa Rican references). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 535 (critical).

*Myiochanes lugubris* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 516 (high mountains of Costa Rica, Barránca, Birrís, Dota, Irazú, La Hondura, Carrillo, Coliblanco; and western Panama).

U. S. Nat. Museum: El Copey and La Lagunaria de Dota (Basulto).

Bangs Collection: Volcan de Irazú, La Hondura, Carrillo (Underwood).

Fleming Collection: Carrillo and La Hondura (Underwood).

Carnegie Museum: La Hondura (Carriker). Two skins.

This species is confined to the humid forests of the upper Caribbean slope, the mountains of the interior, and the Dota Mountains. It is not abundant in individuals in any one locality, and has the habits of the other species of the genus.

466. **Nuttallornis borealis** (Swainson).

*Contopus borealis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 115 (Costa Rica [Cabanis, J. f. O. 1861, 248]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 234 (Irazú district [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 80 (Costa Rican references). — CHERRIE, Auk, VII, 1890, 334 (San José, five seen in two years); IX, 1892, 251 (San José, from Oct. 2 to May 7, never common). — UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Contopus cooperi* CABANIS, Jour. für Orn., 1861, 248 (Costa Rica [Hoffmann]).

*Nuttallornis borealis* OBERHOLSER, Auk, XVI, 1899, 331 (crit.). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 505 (North America, south in winter through Central America to Peru. — Costa Rica: Irazú, Coliblanco, San Jose, Volcan de Miravalles).

Bangs Collection: Escazú, Oct. 30; San José, Oct. 28; Cerro de Santa Maria, Jan. 8 (Underwood).

Fleming Collection: Los Cuádro de Irazú, San José, and Azahar de Cartago (Underwood).

Carnegie Museum: Volcan de Irazú, April 14, 1902; Tierra Blanca, April 11, 1902; Volcan de Turrialba, Oct. 21, 1907 (Carriker). Three skins.

The Olive-sided Flycatcher is not a common migrant in Costa Rica, merely a solitary bird being seen here and there in the highlands and

mountains. It is most abundant on the high volcanoes, above 7,000 feet. While in that country its habits seem to be very much the same as in Canada, except that it never utters its call, and does not seem to be so shy and difficult to approach as during the breeding season.

467. **Mitrephanes aurantiiventris** (Lawrence).

*Mitrephorus aurantiiventris* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 173 (Tabacales, Costa Rica [Frantzius]); IX, 1868, 114 (Tabacales and La Palma [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Quebrada Honda, La Palma, Tabacales, La Candelaria, Dota [Carmioli]). — BOUCARD, P. Z. S., 1878, 64 (La Laguna, La Candelaria, and Juan Viñas).

[*Mitrephorus*] *aurantiiventris* SALVIN, Ibis, 1869, 315, *in text* (crit.).

*Mitrephanes aurantiiventris* RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 414 (Cervantes, 1882 [Cooper]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (La Palma de San José). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 219 (Tucurríqui [Arcé], Irazú [Rogers], Barranca (de Póas ?) [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 67 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 501 (Chiriquí to Costa Rica: Tabacales, Dota, La Palma de San José, Cervantes, Barranca, Tucurríqui, Naránjo, La Candelaria, La Laguna, San Mateo, Volcan de Irazú, Volcan de Barba, Cariblanco de Sarapiquí, Coliblanco, San Carlos, Carrillo, El Achióte de Póas, Buena Vista).

*Mitrephorus phæocercus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (C. R. ["Enrique Arcé, Coll. Salvin"]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica).

U. S. Nat. Museum: La Lagunaria de Dota (Basulto).

Bangs Collection: Carrillo, Volcan de Barba, Volcan de Irazú, Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Juan Viñas (Carriker). Four skins.

This species is distributed over the higher parts of Costa Rica and down the Caribbean slope to about 1,500 feet, wherever there is heavy virgin forest. It is not an abundant bird in any locality, a pair here and there occurring in the forest, usually near a small open spot where a large tree has fallen.

468. **Terenotriccus erythrurus fulvularis** (Salvin and Godman).

*Myiobius erythrurus* (not of Cabanis) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Angostura and Pacuare [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — BOUCARD, P. Z. S., 1878, 64 (San Carlos). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1884, 414 (Dos Novillos, Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (Las Trojas, Pacuare, Pózo Azul de Pirrís). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 34 (Boruca).

*Myiobius fulvigularis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 58 (Costa Rican references). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 506 (Rio Frio).

*Terenotriccus fulvigularis* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 207 (crit.). — BANGS, Auk, XXIV, 1907, 302 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

*Terenotriccus erythrurus fulvigularis* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 495 (Honduras to eastern and central Peru. — Costa Rica: Angostura, Pacuare, Dos Novillos, Las Trojas, Talamanca, Rio Frio, Carrillo, Juan Viñas, Reventazón, Pózo Azul de Pirris).

Bangs Collection: Carrillo, La Vijagua; El General and Buenos Aires de Térraba (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirris, Guácimo, Cuábre, Rio Sicsola, Carrillo, El Hogar, El Pózo de Térraba (Carriker). Fourteen skins.

An abundant woodland species over the entire Caribbean lowlands and lower slopes up to about 3,000 feet, and the Pacific slope from the Gulf of Nicoya southward up to 1,500 feet. It is most abundant at about 500 to 1,000 feet in the Caribbean lowlands. Its habits are quite similiar to *Myiobius*, except that it is not such a restless bird, remaining perched in one place for a long time, darting out after an insect only at intervals. It is partial to thick jungle or places where there are many vines hanging from low trees. The nest is similar to that of *Myiobius*, only much smaller, less elaborate, and rather loosely constructed. I found one hanging from a vine about eight feet from the ground above an old abandoned path in the forest. It contained two young birds.

#### 469. *Aphanotriccus capitalis* (Salvin).

*Myiobius capitalis* SALVIN, P. Z. S., 1864, 583 (Tucurríqui, Costa Rica [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Tucurríqui [Arcé]). — FRANTZIUS, Jour. für Orn., 1869, 308 (C. R.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 59 (reference to type).

*Mitrephanes capitalis* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 220 (Tucurríqui, Costa Rica).

*Aphanotriccus capitalis* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 207 (crit.); Birds N. and Mid. Amer., IV, 1907, 492 (Costa Rica: Tucurríqui, Jiménez, and La Concepcion de Jiménez).

Bangs Collection: Jiménez, June, 1892, ♀ (Underwood).

C. H. Lankester Collection: El Hogar, one specimen.

This is another of the exceedingly rare Central American birds, but four specimens of it ever having been taken since the collection of the

type by Arcé at Tucurríqui in 1863 or 1864. The first one taken after that was a ♂ collected at La Concepcion de Jiménez by Geo. K. Cherrie, Jan. 10, 1890 (Coll. U. S. Nat. Mus.), and in June, 1892, a female was secured at Jiménez by C. F. Underwood (Bangs Coll.). Lastly, Mr. C. H. Lankester secured a specimen at El Hogar, not far from Jiménez, in 1907. The U. S. National Museum possesses another skin from eastern Nicaragua, collected by Nutting. Nothing is known of it in life, more than that it is an inhabitant of the heavy forest, with habits perhaps similar to *Myiobius* or *Mitrephanes*.

470. *Myiobius xanthopygius aureatus* Bangs.

*Tyrannula sulphureipygia* SCLATER, P. Z. S., 1856, 296 (Cordova, Mexico).

*Myiobius sulphureipygius* SCLATER, P. Z. S., 1859, 384 (Playa Vicente, Vera Cruz); Cat. Birds Brit. Mus., IV, 1888, 200 (Tucurríqui [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — BOUCARD, P. Z. S., 1878, 64 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (Jiménez, Rio Súcio, Pózo Azul de Pirrís). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 57 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 34 (Lagarto, Boruca, Térraba, Buenos Aires). — UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Myiobius xanthopygius sulphureipygius* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 490 (southern Mexico to Sante Fé de Veragua; Costa Rica: Angostura, Tucurríqui, Reventazón, Jiménez, Carrillo, Bonilla, Cariblanco de Sarapiquí, Naránjo, Miravalles, Pózo Azul de Pirrís). — BANGS, Auk, XXIV, 1907, 302 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

*Myiobius xanthopygius aureatus* BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 27 (Divála, Chiriquí).

Bangs Collection: Pózo Azul de Pirrís, El General de Térraba, Tenorio, La Vijagua, and Carrillo (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirrís, Volcan de Turrialba, 2,000 feet; Guácimo, Rio Sicsola, Miravalles, El Hogar, El Pózo de Térraba, Boruca, Buenos Aires (Carriker). Eighteen skins.

This is the common *Myiobius* of Costa Rica, being found on both coasts up to an altitude of about 3,000 feet on the Caribbean slope and 2,000 feet on the Pacific. It is found only in the forest, usually near a little brook, flitting about among the low limbs of the trees and shrubbery. The birds are very silent; in fact I do not think I have ever heard them utter more than a faint chirp.

I found them breeding commonly about Guápiles, Jiménez, and El Hogar, and the nests were invariably of similar construction and placed in the same situation, viz., suspended from a slender vine or the tip of a pendant branch hanging over a pool in a creek making its way through the thick forest. I also took two badly incubated eggs at Guaitíl, May 4, from a nest of similar construction and situation. The birds began breeding in the Santa Clara Valley about April 24 to May 10, at which time a nest could always be found by following a little brook through the forest for a short distance. The nest is a purse-shaped mass of grass, roots, and bark-fibres, about eighteen inches long, very slender at the upper end and about three and one-half inches in diameter at the largest part (about four inches from the bottom). The entrance to the cavity of the nest is on one side, four inches from the bottom and protected by an overhanging flap of the material of the nest. The eggs are invariably two in number, creamy white, sometimes with a roseate tinge, and thickly speckled, streaked, and scrawled over the entire surface with bright chestnut-rufous, heavier at the larger end, in the form of a wreath or cap. Sometimes the markings have a decided purplish color. Measurements: 17 to 20  $\times$  12 to 14 mm.; average, 18.5  $\times$  13 mm.

471. *Myiobius barbatus atricaudus* (Lawrence).

*Myiobius barbatus* SCLATER, P. Z. S., 1869, 282 (Babahoyo, Ecuador); Cat. Birds Brit. Mus., XIV, 1888, 199, *part* (Veragua to Ecuador). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 56 (one Costa Rican reference).

*Myiobius atricaudus* LAWRENCE, Ibis, 1863, 183 (Lion Hill, Panama [M'Leannan]) — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 396 (La Palma de Nicoya).

*Myiobius barbatus atricaudus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 488 (Peru to western Costa Rica: La Palma de Nicoya, Pózo Azul de Pirrís, Rio Naránjo). — BANGS, Auk, XXIV, 1907, 302 (Boruca and El Pózo de Térraba [Underwood]).

Bangs Collection: Buenos Aires and El General de Térraba; Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Boruca and Buenos Aires (Carriker); Pózo Azul de Pirrís (Underwood). Four skins.

This *Myiobius* is restricted in Costa Rica to the southwestern Pacific coast region, from the Gulf of Nicoya southward, and from sea-level up to about 1,500 feet. It is very rare north of the Térraba Valley and even there is much less abundant than *M. xanthopygius aureatus*. In life this species can be distinguished from the last named species at a glance, for its actions are very different. It is always seen rather high up in the trees, flitting



from branch to branch much like a warbler or some of the vireos, and usually has its tail considerably spread, which distinguishes it at once by its greater length and blackness. This species is also usually seen farther away from creeks and streams than the other, sometimes high up on the crest of a ridge far from any water, a situation in which I have never seen *aureatus*.

472. **Nesotriccus ridgwayi** Townsend.

*Nesotriccus ridgwayi* TOWNSEND (C. H.), Bull. Mus. Comp. Zool., XXVII, no. 3, 1905, 124, plate (Cocos Island; coll. U. S. Nat. Mus.). — SNODGRASS and HELLER, Proc. Wash. Acad. Sci., IV, 1902, 518 (description). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 482 (Cocos Island, off Pacific coast of Costa Rica).

"Only one specimen was obtained, and to the best of my recollection only two or three others were seen. They were observed among the tree-ferns in a deep ravine at Chatham Bay." (Townsend, Bull. Mus. Comp. Zool. 1905, 124).

473. **Capsiempis flaveola** (Lichtenstein).

*M[uscicapa] flaveola* LICHTENSTEIN, Verz. Doubl., 1823, 56 (Bahia, Brazil). *Capsiempis flaveola* SCLATER, Cat. Amer. Birds, 1862, 214 (Brazil); Cat. Birds Brit. Mus., XIV, 1888, 120, *part* (Chiriquí to Bolivia). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 28 (no Costa Rican record). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 32 (Boruca and Buenos Aires, ten specimens). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 469 (Nicaragua to southern Brazil; — Costa Rica: Pózo Azúl, Jiménez, [and San Juan].

Bangs Collection: Pózo Azúl de Pirrís and El General de Térraba.

Carnegie Museum: Guápiles, ♂ & ♀ (Carriker & Crawford); Pózo Azúl de Pirrís, one ♂; Rio Sicsola, one ♂; Buenos Aires de Térraba, two ♂'s (Carriker). Six skins.

Mr. Cherrie first took this species at Jiménez in 1891 (Expl. Zool. en C. R. 1893, 32) and again in Térraba in 1892. These are the only published records for its occurrence in Costa Rica, except those given by Mr. Ridgway in his "Birds of North and Middle America."

The bird is sparingly distributed over the lowlands of both the Caribbean and Pacific, at least the southern part of the latter, from Pózo Azúl southward. I took it in Talamanca and at Guápiles, the extreme portions of the Caribbean lowlands, and also at Pózo Azúl and Buenos Aires.

It is not a denizen of the heavy forests, but frequents the low tangled woodland along the margins of streams, and the edges of the forest. It is an active little creature, seldom remaining quiet for a moment, but

hopping and fluttering about among the low trees and bushes and feeding very much after the manner of the vireos.

I took a single nest at Guápiles, May 8, 1905, containing two fresh eggs. It was a cup-shaped structure, made entirely of moss, lined with fine black and brown vegetable fibers and placed in a crevice on the side of a large tree, between two projecting spur-roots about four feet above the ground. The eggs are deep cream-color, with a few markings of lilac and small blotches of bright cinnamon-rufous scattered over the whole surface, but thicker about the larger end, forming a wreath.

Measurements:  $17 \times 13$  and  $17 \times 13.5$  mm.

#### 474. *Leptopogon superciliaris* Cabanis.

*Leptopogon superciliaris* CABANIS, in Tschudi's Fauna Peruana, Aves, 1845, 161, pl. 10, fig. 2. — SALVIN, Ibis, 1870, 115 (Costa Rica [J. Carmiol]). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 115 (Costa Rica, Carmiol, one skin). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888 (Salvin's record cited). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 465 (Costa Rica to Bolivia; — Costa Rica: Guayabal and Carrillo).

U. S. Nat. Museum: Guayábo, one ♀ (Ridgway and Zeledón).

Bangs Collection: Carrillo, six specimens; El General (Underwood).

This is a very rare species, not only in Costa Rica, but throughout its range. It has been taken in Costa Rica, with the exception of one skin, only in the northeastern part of the Caribbean lowlands, most of the existing specimens having been taken at Carrillo, one at Guayábo, and one at Guayabal. The other skin in Mr. Bangs' collection came from El General de Térraba. It is a woodland bird, but just what kind of localities it inhabits I do not know, never having taken the bird. It may be that in life it closely resembles some common species, thus escaping the notice of collectors in general.

#### 475. *Leptopogon pileatus faustus* Bangs.

*Leptopogon pileatus* CABANIS, Jour. für Orn., 1865 (pub. Jan., 1866), 414 (Guatemala). — SALVIN, Ibis, 1869, 319 (Valsa [J. Carmiol]). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 116, *part* (Valsa [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 25, *part* (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 463, *part* (southern Mexico to Panama City; — Costa Rica: Valsa).

*Leptopogon pileatus faustus* BANGS, Auk, XXIV, 1907, 300 (type from Boruca, Costa Rica, May 5, 1906; C. F. Underwood; — five adults, both sexes, Boruca and Paso Real).

Bangs Collection: Tenorio, one specimen (Underwood).

C. H. Lankester Collection: Miravalles, May 27, 1906, one specimen.

Similar to *L. pileatus* of southern Mexico and Guatemala, except that the back is lighter green and the under parts much paler, abdomen primrose-yellow. It is nearer to *L. superciliaris* in general coloration than to *L. pileatus*, except for the brown instead of gray cap. The single specimen from Tenorio is rather intermediate between the Boruca birds and Mexican specimens, having the back dark green as in the latter, with the lower parts pale like the type of the new form from Boruca.

I can give nothing concerning the habits or habitat of this species, more than that it is taken in the forest, like its near relative, *L. superciliaris*.

476. ***Mionectes olivaceus olivaceus* Lawrence.**

*Mionectes olivaceus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 111 (publ. March, 1869), (Barránca and Dota [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — SALVIN, Ibis, 1869, 314, *in text* (crit.). — BOUCARD, P. Z. S., 1878, 63 (San Mateo). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 414 (Costa Rica [Zeledón]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Naránjo de Cartago). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 112 (Buena Vista and Barránca [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 22, *part* (Costa Rica to Ecuador).

*Mionectes olivaceus olivaceus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 461 (Costa Rica and Panama, Costa Rica: Barránca, Dota, San Mateo, Bueno Vista, Naránjo, Azahar de Cartago, Cariblanco de Sarapiquí, Los Cuádro del Mojón, Carrillo).

U. S. Nat. Museum: La Lagunaria de Dota (Basulto).

Bangs Collection: Cariblanco de Sarapiquí, Carrillo, Cerro de Santa Maria, Azahar de Cartago (Underwood).

C. H. Lankester Collection: Carrillo.

Fleming Collection: La Hondura (Underwood).

Carnegie Museum: Juan Viñas (Carriker). Three skins.

I found this species only in the thick, dark, virgin forest on the mountain slopes above Juan Viñas, where several were secured and where it was by no means a rare bird, but very shy and difficult to shoot. It usually perched near the ground, and at the slightest disturbance flew away for fifty or a hundred yards before alighting again. It has been taken in many localities scattered over a wide area, but always above an elevation of 1,500 feet, and from that up to at least 5,000 feet.

From the conditions in which I found it, I would imagine it to be more partial to the heavy, humid forests of the Caribbean watershed. Basulto took it high up in the Dota Mountains and Underwood in the Cerro de Santa Maria near the Pacific coast in northern Costa Rica, both of which

localities are noted for their excessive humidity, caused by fog and mist, rather than actual rainfall.

477. **Pipromorpha semischistacea** (Cherrie).

*Mionectes semischistacea* CHERRIE, Proc. U. S. Nat. Mus., XV, 1892, 27 (Guayabal, Costa Rica, Feb. 24, 1891; type in coll. U. S. Nat. Mus.).

*Pipromorpha semischistacea* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 458 (eastern Costa Rica, Guayabal, near Turrialba).

This bird is known only from the single type specimen. It is a very distinct form, yet has a very peculiar appearance, as though it might possibly be a hybrid, which supposition is strengthened by the fact that no more specimens of it have ever been taken.

478. **Pipromorpha assimilis dyscola** (Bangs).

*Mionectes oleagineus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 111, *part* (Costa Rica "[Enrique Arcé]; coll. O. Salvin"). — FRANTZIUS, Jour. für Orn., 1869, 397, *part* (Costa Rica). — BOUCARD, P. Z. S., 1878, 63 (San Mateo). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 112, *part* (Guaitíl [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 22, *part* (Costa Rican references). — UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Mionectes assimilis* (not of Sclater) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 111, *part* (Guaitíl). — FRANTZIUS, Jour. für Orn., 1869, 397, *part* (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Pózo Azul de Pirrís, Las Trojas, Monte Redondo). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 31 (Palmar, Lagarto, Boruca, Térraba).

[*Mionectes oleagineus*] *a.* subsp. *assimilis* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 113, *part* (Guaitíl).

*Mionectes assimilis dyscola* BANGS, Auk, XVIII, 1901, 362 (Panama).

*Pipromorpha assimilis dyscola* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 455, *part* (Nicaragua to Veragua;— Costa Rica: San Mateo, Guaitíl, Volcan de Miravalles, Pózo Azul de Pirrís, Pózo Pital). — BANGS, Auk, XXIV, 1907, 300 (Boruca, Paso Real, El Pózo and Barranca de Térraba [Underwood]).

Bangs Collection: Pózo Azul de Pirrís, Buenos Aires, El General de Térraba, Tenorio (Underwood).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Pózo Azul de Pirrís, Miravalles, El Pózo de Térraba, Boruca (Carriker). Twelve skins.

The status of the species *Pipromorpha assimilis* in Costa Rica is a rather peculiar one, representatives of both *P. a. assimilis* and *dyscola* being found there, but neither are typical examples of the subspecies to which they belong. All the birds from the Pacific slope are nearer to *dyscola*, those from the Térraba Valley being almost typical, while from Guana-

caste they are less so. All the birds from the Caribbean are referable to true *assimilis*.

This is one of the most abundant of the woodland flycatchers found in Costa Rica, inhabiting the Pacific slope from sea-level up to at least 3,500 feet (Guaitíl). Its habits are more like a vireo than a true tyrant-bird, while it is frequently found in company with *Pachysylvia ochraceiceps* and some of the small arboreal *Formicariidæ*. It is always seen in the heavy forest, rather low down in the small trees and shrubbery, and is usually alone when not in company with some of the above mentioned birds. Although a common bird I have never found its nest.

479. *Pipromorpha assimilis assimilis* (Sclater).

*Mionectes oleaginus* (not *Muscicapa oleaginea* Lichtenstein) SCLATER, P. Z. S., 1856, 296 (Cordova, Mexico).

*Mionectes oleagineus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, III, *part* (Costa Rica " [Enrique Arcé]; coll. O. Salvin, "). — FRANTZIUS, Jour. für Orn., 1869, 397, *part* (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 112, *part* (Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 22, *part* (Costa Rican references).

*Mionectes assimilis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, III, *part* (Angostura and Pacuare [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307, *part* (Costa Rica).

[*Mionectes oleagineus*] *a.* subsp. *assimilis* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 113, *part* (Turrialba [Arcé]).

[*Pipromorpha*] *assimilis* HEINE and REICHENOW, Nom. Mus. Hein., 1890, 141 (Cordova, Mexico).

*Pipromorpha assimilis dyscola* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 455, *part* (Nicaragua to Veragua; — Costa Rica: Angostura, Pacuarito, Matina, Val, Guayabal, Turrialba, Pacuare, Bonilla, Jiménez).

*Pipromorpha assimilis assimilis* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 454, *part* (Mexico to southern Honduras). — BANGS Proc. Biol. Soc. Wash., XXII, 1909, 33 (northern Costa Rica; critical).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón).

Bangs Collection: Guayabal, La Vijagua, Carrillo, Matina (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), Cuábre, Rio Sicala, Carrillo, El Hogar, Peralta (Carriker). Eight skins.

All the birds from the Caribbean slope of Costa Rica that I have been able to examine are much nearer to typical *assimilis* than to *dyscola*, although none are typical of the northern birds. Those from La Vijagua are nearer to birds from British Honduras than any others on the eastern slope of Costa Rica, but all are very noticeably distinct from birds from the Pacific slope, especially those from Térraba. Guanacaste birds are

more nearly true intermediates than any others, for it is here that the two races actually come together. This bird occupies about the same altitudinal range on the Caribbean as does *dyscola* on the Pacific, while its habits and habitat are identical.

480. ***Myiozetetes granadensis* Lawrence.**

*Myiozetetes granadensis* LAWRENCE, Ibis, 1862, 11 (Lion Hill, Panama); Ann. Lyc. N. Y., IX, 1868, 112 (Orósi, Costa Rica). — FRANTZIUS, Jour. für Orn.; 1869, 307 (Orósi). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Rio Súcio). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 163 (no Costa Rican specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 42 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 33 (Palmar, Boruca, Lagarto, Buenos Aires). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 450 (Honduras to E. Peru; — Costa Rica: Navárrro, Sipurio, Orósi, Jiménez, and Pígres).

Bangs Collection: El General de Térraba, Carrillo, Jiménez, Reventazón, Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirrís, El Pózo, Boruca, and Buenos Aires de Térraba (Carriker). Seven skins.

This *Myiozetetes* is usually found in company with *M. texensis*, though it is never so abundant as that species, and unlike it is not found in the highlands, being restricted to the lowlands of both the Caribbean and the Pacific from sea-level up to about 1,500 feet. Its habits are about the same, although it usually seems to be more retiring and less pugnacious than *texensis*. All the species of *Myiozetetes* eat a great deal of fruit and berries whenever they are in season, and are always to be seen in the same trees feeding with cotingas and several species of tanagers. At other times their food consists of various insects, usually caught on the wing.

I took the nest and eggs of this bird at both Guápiles and on the Rio Sicsola. It is precisely like the nest of *M. texensis*, that is, elbow-shaped, made of grass, weed-stalks, and roots, lined with very fine dry grass, and placed in an upright crotch of a tree or on a broken snag projecting from the river. The two nests taken were about ten inches long and five inches in diameter at the larger end.

The eggs are creamy-white, speckled, spotted, and blotched with cinnamon-rufous or purplish umber-brown, more heavily about the larger end. Each nest contained three eggs, that from Guápiles having been taken July 16, the other from Rio Sicsola on March 8, both with incubation begun. It is very probable that like our common Kingbird,

they raise two broods in a season. Eggs measure: 25.5 to 29×16 to 18 mm.

481. ***Myiozetetes texensis columbianus*** (Cabanis and Heine).

*M[yiozetetes] columbianus* CABANIS and HEINE, Mus. Hein., II 1859, 62 (Puerto Cabello, Venezuela, and Cartagena, Colombia).

*Myiozetetes texensis columbianus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 449 (Chiriquí to Venezuela).

*Myiozetetes similis superciliosus* BANGS, Auk, XXIV, 1907, 302 (Boruca, two specimens [Underwood]).

Bangs Collection: El General de Térraba (Underwood).

Carnegie Museum: El Pózo, Boruca, and Buenos Aires de Térraba (Carriker). Eight specimens.

The Colombian race of *M. texensis* has not heretofore been recognized from Costa Rica, the specimens taken by Underwood at Boruca having been reported by Mr. Bangs (Auk, XXIV, 1907, 302) as the northern bird. All of the specimens which I secured in the Térraba Valley are typical *columbianus*, being just as small as a series of skins from Loma del Leon, Panama, and averaging smaller than birds from Chiriquí, labelled *columbianus* by Mr. Ridgway. The color of the pileum and the sides of the head also agrees with that of the southern birds. I have examined the two specimens from Boruca and several from El General in the collection of Mr. Bangs and find that they are likewise typical *columbianus*.

They are found only in open country, where there are trees scattered about, or in orchards, roadsides, or trees along the edges of streams, the latter being a favorite resort. I found a few birds at Pózo Azul de Pirrís in such a situation, and saw several nests, one of which was secured on May 8, 1902, containing two slightly incubated eggs. This species also lays three and four eggs. The nest in question was of the usual type, elbow-shaped, and hung over a crotch in a "Cornusuela" tree about twelve feet from the ground. The "Cornusuela" tree deserves a word of description, for it is resorted to by several species of birds for nesting purposes. It is a small tree, not growing higher than thirty feet, usually less, is rather bushy, and has all the limbs armed with huge needle-pointed thorns, set in pairs on opposite sides of the twig. The thorns are just about the shape of a bison's horn, and are quite hollow with only a thin shell. There is a species of medium-sized black ant, which is always found living in these thorns, gaining entrance to the hollow interior by boring a small hole through the outer shell near the tip. At the slightest disturbance of any portion of the tree, all the ants pour out of the thorns

and hasten to the disturbed portion of the tree, with the idea that there is some sort of prey to be secured, and woe betide the luckless person or animal upon whom they descend, for the particular brand of formic acid which they produce is about the worst I have ever encountered. To make matters worse for the poor oölogist there is never less than one wasp's nest in the same tree, and the bird is always very particular to select the same limb for its nest as is occupied by the vicious, trouble-hunting wasps. I do not therefore need to further dwell upon the difficulties of securing nests placed in "Cornusuela" trees.

The eggs are creamy-white, with a slightly rosy tinge, speckled and blotched with lilac and umber-brown. Measurements:  $23.5 \times 18$  and  $25 \times 16$  mm.

482. ***Myiozetetes texensis texensis*** (Giraud).

*Muscicapa texensis* GIRAUD, Sixteen Species of Texas Birds, 1841, pl. 1 ("Texas"; type in U. S. Nat. Mus.).

*Myiozetetes texensis* SCLATER, P. Z. S., 1859, 56 (Honduras).—CABANIS, Jour. für Orn., 1861, 245 (highlands of Costa Rica [Hoffmann and Frantzius]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 (Angostura and San José [J. Carmiol], Cartago [Cooper]).—FRANTZIUS, Jour. für Orn., 1869, 307 (whole highlands of Costa Rica).—BOUCARD, P. Z. S., 1878, 63 (San José and Juan Viñas).—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 500 (San José [Nutting]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (San José, Cartago, Las Trojas, Jiménez, Monte Redondo).—SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 162, *part* (Costa Rica [Endres, Carmiol, and Van Patten]).—CHERRIE, Auk, VII, 1890, 235 (San José, nesting habits); IX, 1892, 250 (San José).—ALFARO, Paginas Ilustradas, II, 1905, 803 (Costa Rica, habits; descr. nest and eggs).

*Myiozetetes marginatus* (not of Lawrence, 1863) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 (Costa Rica [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica).

*Myiozetetes similis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 41, *part* (Costa Rican references).—UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Myiozetetes texensis texensis* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 446 (southern Mexico to Costa Rica: San José, Cartago, Bonilla, Jiménez, Sipurió, Grecia, Alajuéla, Bebedero, San Sebastian).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón).

Bangs Collection: Tenorio, Bebedero, San José (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirrís, Juan Viñas, Miravalles (Carriker). Seven skins.

Giraud's Flycatcher is the common *Myiozetetes* in the highlands of Costa Rica, although it is also found sparingly over the greater portion of the Caribbean lowlands and the northwestern Pacific region as far south as



Pózo Azul de Pirrís, but in the extreme southwestern portion it is replaced by *M. t. columbianus*. The habits of this bird are so well known that no description of them is necessary.

483. *Legatus albicollis* (Vieillot).

*Tyrannus albicollis* VIEILLOT, N. Dict. d'Hist. Nat., XXXV, 1819, 89 (Paraguay).

*Legatus albicollis* SCLATER, P. Z. S., 1859, 46, *in text*. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 (San José, Guaitíl, and Turrialba [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — BOUCARD, P. Z. S., 1878, 63 (Juan Vinas, several). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 155 (San José [Carmiol], Tucurríqui and La Barránca [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 38 (Costa Rican references). — CHERRIE, Auk, IX, 1892, 250 (San Sebastian de San José); Expl. Zool. en C. R., 1890-1, 1893, 33 (Térraba and Buenos Aires). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 439 (S. E. Mexico to Paraguay. — Costa Rica: San José, Tucurríqui, Barránca de Nicoya, Turrialba, Guaitíl, Naránjo, Navarro, Reventazón, Pózo Azul de Pirrís). — BANGS, Auk, XXIV, 1907, 302 (Boruca [Underwood]).

*Legatus variegatus* CABANIS, Jour. für Orn., 1861, 245 (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Basulto).  
Bangs Collection: San José, Reventazón, Pózo Azul de Pirrís, Buenos Aires, and El General de Térraba (Underwood).

C. H. Lankester Collection: Tuis and Guanacaste.

Carnegie Museum: Juan Viñas, Guaitíl, Miravalles, Bagáces, Esparta (Carriker). Eleven skins.

This flycatcher at once attracts attention on account of its peculiar streaked appearance and the strikingly melancholy note which it frequently utters. Its habitat is about the same as that of *Elenia* and *Tyrannus melancholicus*, in company with which it is frequently found in open woodlands, by roadsides, edges of forests, and banks of streams. Its range extends between 2,000 and 3,500 feet on the Caribbean side, and between sea-level and 3,000 feet on the Pacific slope. It is not an abundant bird in any locality, only a pair occurring here and there. I took a nest with three badly incubated eggs at Guaitíl on May 4, 1902. The manner of the construction of the nest of this species seems to point to a close relationship with the genus *Myiozetetes*, for the nests are built in precisely the same manner. It is an elbow-shaped structure, made of weed-stalks and grass, and hung in an upright crotch of a small tree, so that each end is some inches lower than the middle. The opening is from below, at one

end, with a passage about ten inches in length to the other end, which is slightly enlarged to accommodate the cavity of the nest. The eggs are pale burnt umber, with a wreath of blackish umber spots around the larger end, also some scrawls and pencilings of the same color over the entire surface. Measurements:  $20.5 \times 16$ ,  $21.5 \times 16$ , and  $22 \times 16$  mm.

484. *Elænia frantzii frantzii* Lawrence.

*Elainea frantzii* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 172 (San José [Frantzii]); IX, 1868, 112 (San José [Frantzii], Barránca and Dota [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (S. W. Costa Rica). — BOUCARD, P. Z. S., 1878, 63 (Irazú). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 496 (Volcan de Irazú [Nutting]). — ZELEDÓN, An Mus. Nac. de C. R., I, 1887, 116 (Cartago). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 145, *part* (Dota [Carmiol], Irazú district [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 36 (Costa Rican references).

*Elænia frantzii frantzii* RIDGWAY, Birds N. and Mid. Amer., 1907, 434 (Guatemala to Panama. — Costa Rica: San José, Irazú, Santa Maria de Dota, Las Cruces de Candelaria, Barránca, Volcan de Turrialba, La Estrella de Cartago).

U. S. Nat. Museum: El Copey and Santa Maria de Dota (Basulto).

Bangs Collection: Volcan de Irazú, Cerro de Santa Maria, Azahar de Cartago (Underwood).

Carnegie Museum Collection: Volcan de Irazú, 8,000 feet; Miravalles, Juan Viñas (Carriker). Seven skins.

Frantzii's *Elænia* occupies the higher portions of the country, being regularly found on all the volcanoes from near timber-line down to 4,000 feet, and irregularly to even lower altitudes, overlapping the range of *subpagana* for some distance. The bird breeds at high altitudes, and it is quite probable that those taken low down are merely altitudinal migrants, which, after the breeding season, have descended in search of better feeding-grounds. The habits of this species are similar to those of *subpagana*, although the birds can easily be distinguished in life after a little practice. I found it breeding on the Volcan de Irazú about the middle of April, when several nests were taken, each containing but two eggs.

The nest is constructed of roots, weed-stalks, fine grass, and moss, and is always lined with fine black roots, hairs, and a few feathers. It is usually placed in an upright crotch from fifteen to twenty feet above the ground. The nest measures about  $3.5 \times 2$  outside, and  $2 \times 1.25$  inches inside. The eggs are creamy-white, with a few scattering specks and spots of bright chestnut-brown about the larger end, or else with the markings

scattered over the larger half of the egg. Measurements: 18.5 to 20×15 to 16 mm.

485. ***Elænia chiriquensis chiriquensis*** Lawrence.

*Elainea chiriquensis* LAWRENCE, Ann. Lyc. N. Y., VIII, 1867, 176 (David, Panama).

*Elænia chiriquensis chiriquensis* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 432 (Chiriquí to Santa Marta, Colombia). — BANGS, Auk, XXIV, 1907, 301 (Boruca, Paso Real, and Lagarto de Térraba [Underwood]).

Bangs Collection: Buenos Aires and El General de Térraba (Underwood).

Carnegie Museum: Boruca and Buenos Aires de Térraba (Carriker).

Five skins.

The first record we have of the occurrence of this species in Costa Rica is that published in the Auk, 1907, 301, by Mr. Bangs, recording the specimens collected by Underwood in the Térraba Valley in 1906. Underwood secured twelve specimens, all of which are typical *E. chiriquensis*. The following year I secured a small series from Boruca and Buenos Aires. The bird is usually found in company with *Myiopagis placens* and *Myiozetetes*, either in scattering woodland, second-growth scrub, or along the margins of the streams. Its habits are essentially the same as those of the other Costa Rican species of the genus.

486. ***Elænia martinica subpagana*** (Sclater and Salvin).

*Elainea subpagana* SCLATER and SALVIN, Ibis, 1860, 36 (Duenas, Guatemala).

— LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 (San José, Costa Rica [J. Carmiol]). — CABANIS, Jour. für Orn., 1861, 244 (highlands of Costa Rica [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica).

*Elainea pagana subpagana*, CHERRIE, Auk, IX, 1892, 250 (San José); Expl. Zool. en C. R., 1890-1, 1893, 32 (Boruca, Térraba, and Buenos Aires).

*Elainea pagana* BOUCARD, P. Z. S., 1878, 63 (San José). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 500 (San José, Nutting). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Alajuela and San José). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 137 (Irazú [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 34, *part* (Costa Rican references). — ALFARO, Paginas Ilustradas, II, 1905, 803 (Costa Rica; habits, descr. nest and eggs).

*Elænea pagana* CHERRIE, Auk, VII, 1890, 235 (San José; nesting habits).

*Elænia martinica subpagana* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 429 (southern Mexico to Panama; — Costa Rica: San José, Irazú, Pígres).

*Elainea flavogastra subpagana* BANGS, Auk, XXIV, 1907, 301 (Boruca, Paso Real, and Lagarto de Térraba [Underwood]).

U. S. Nat. Museum: Dota Mountains (Basulto), Volcan de Turrialba, San Juan de Irazú (Ridgway).

Bangs Collection: San José, Bolson, Carrillo, Buenos Aires, and El General de Terraba (Underwood).

Carnegie Museum: Guaitíl, Tierra Blanca, Miravalles, Boruca, Buenos Aires (Carriker). Nine skins.

This species of *Elænia* occupies the central plateau and the Pacific slope down to about 1,000 feet above sea-level, and is rarely taken as a straggler on the Caribbean watershed (Carrillo). It keeps entirely in the open, never being taken in the forest. It is fond of trees along roadsides, streams, and in scattering woodland. It is quite common in the hills about Boruca around the edges of the "sabanas."

I took a nest with two fresh eggs at Guaitíl, May 3, 1902, which was exactly like those described by Mr. Cherrie (Auk, VII, 1890, 235), much resembling the nest of the common Wood Pewee (*Myiochanes virens*). It was a well-built, cup-shaped structure, made of roots and weed-stems, covered over on the outside with lichens, and placed in an upright crotch about twelve feet above the ground. The eggs are creamy-white, with a slightly rosy tinge, having a few markings of lilac, and a wreath of chestnut dots around the larger end. Measurements:  $21.5 \times 16$  and  $22 \times 16$  mm.

#### 487. *Sublegatus arenarum* (Salvin).

*Elainea arenarum* SALVIN, P. Z. S., 1863, 190 (Puntarenas [O. Salvin and J. M. Dow]).

*Elainea arenarum* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 (Puntarenas [Salvin and Dow]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 153 (Puntarenas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, Pl. 36, fig. 3 (not text). — ALLEN, Bull. Am. Mus. Nat. Hist., II, 1889, 208 (synonymy; crit.).

*Sublegatus arenarum* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 37, *part* (Puntarenas). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 420 (Puntarenas).

This bird, if really distinct from the Panaman species, *S. glaber*, is known only from the type specimen collected at Puntarenas by O. Salvin and Capt. J. M. Dow in 1863. Every Costa Rican collector has hunted assiduously for it, but with no success, and the bird still remains one of the many unsolved ornithological mysteries.

#### 488. *Camptostoma imberbe* Sclater.

*Camptostoma imberbe* SCLATER, P. Z. S., 1857, 203 (San Andreas, Vera Cruz, Mexico). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 414 (Mexico to Nicaragua). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 33 (Tenorio, Coraíllo, Bolson, 5 specimens [Underwood]).

*Ornithion imberbe* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 126, *part* (Mexico to Nicaragua). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 29, *part* (no C. R. reference).

C. H. Lankester Collection: Bebedéro, May 4, 1906, ♂.

Carnegie Museum Collection: Bebedéro, May, 1906 (Carriker).

The first specimen of the Beardless Flycatcher actually taken in Costa Rica, of which I have any knowledge, was the one taken by Mr. Lankester at Bebedéro, May 4, 1906, although no record for it was ever published, the second was the specimen in the Carnegie Museum, taken also at Bebedéro. In 1908, Underwood took five specimens at Bolson, Corallillo, and Tenorio, as recorded by Mr. Bangs in a late paper.

It would thus seem that it is a regular resident in the extreme north-western portion of Costa Rica, from the Gulf of Nicoya northward, along the Pacific watershed. It is a common bird farther north, extending up to the southern border of the United States, so that its habits are well known.

489. ***Camptostoma pusillum flaviventre*** (Sclater and Salvin).

*Camptostoma flaviventre* SCLATER and SALVIN, P. Z. S., 1864, 358 (Panama).

*Ornithion imberbe* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 535 (Costa Rica).

*Ornithion pusillum* (not *Myiopatis pusilla*, Cabanis and Heine) SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 126, *part* (Panama). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 30, *part* (Panama, southward).

*Ornithion pusillum subflavum* CHERRIE, Proc. U. S. Nat. Mus., XV, 1892, 28 (Pózo Azul de Pirrís, May, 1891 [Underwood]); Expl. Zool. en C. R., 1890-1, 1893, 32 (Palmár, Lagarto, and Buenos Aires de Terraba).

*Camptostoma pusillum flaviventre* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 417 (Costa Rica and Panama; — Costa Rica: Pózo Azul de Pirrís, Pígres, Bebedéro). — BANGS, Auk, XXIV, 1907, 301 (El Pózo and Paso Real de Terraba [Underwood]); Proc. Biol. Soc. Wash., XXII, 1909, 33 (Bolson, one specimen [Underwood]).

Bangs Collection: Pózo Azul de Pirrís (Underwood).

This southern species comes up the west coast of Costa Rica as far as southern Guanacaste (Bolson), where it meets the northern form, *C. imberbe*. It seems to be fairly common in the Terraba Valley, Cherrie and Underwood both taking several specimens, although I did not get it when there in 1907. The first authentic specimen known from Costa Rica was that taken by Underwood at Pózo Azul de Pirrís in May, 1891, and described by Mr. Cherrie as *Ornithion pusillum subflavum*.

490. ***Leptotriccus superciliaris*** Sclater and Salvin.

*Leptotriccus superciliaris* SCLATER and SALVIN, P. Z. S., 1868, 389 (Chitra, Panama). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 100 (Panama). —

SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 18, Pl. 36, fig. 2 (Panama). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 411 (Panama).

U. S. Nat. Museum: Guayábo, March 29, 1908, ♀ (Ridgway).

This bird was taken first by Arcé at Chitra and afterwards at Calovevora, Panama, where he secured but two specimens. I do not believe that any others have since been taken by any collector, previous to Mr. Ridgway's discovery of the species in Costa Rica at Guayábo in 1908. Nothing, of course, is known concerning the habits or range of the species, more than that it was taken in the forest.

491. ***Tyranniscus vilissimus parvus*** (Lawrence).

*Tyranniscus parvus* LAWRENCE, Ibis, 1862, 12 (Panama); Ann. Lyc. N. Y., IX, 1868, 112 (Turrialba [Arcé]). — SALVIN, P. Z. S., 1867, 147 (Turrialba [Arcé]); Ibis, 1869, 315, *in text* (crit.). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — BOUCARD, P. Z. S., 1878, 63 (Navárro). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 414 (Pózo Azul de Pirrís [Juan Zeledón, 1882]). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 132 (Angostura [Carmioli], Turrialba [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 33 (Costa Rican references). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 535 (Costa Rica; crit.); Expl. Zool. en C. R., 1890-1, 1893, 32 (Boruca and Buenos Aires); Auk, IX, 1892, 250 (San José, one specimen).

*Tyranniscus vilissimus* (not *Elainea vilissimus* Sclater) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 111 (Angostura and Dota [J. Carmiol], Turrialba and Barránca [F. Carmiol]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Naranjo de Cartago, Pózo Azul de Pirrís, Angostura).

*Tyranniscus vilissimus* FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica).

*Tyranniscus vilissimus parvus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 408 (Nicaragua to Panama; — Costa Rica: Turrialba, Angostura, Bonilla, Carrillo, Jiménez, Barránca, Dota, Guayabal, Cariblanco de Sarapiquí, Azahar de Cartago, Pózo Azul de Pirrís). — BANGS, Auk, XXIV, 1907, 301 (Boruca, Paso Real, and El Pózo de Terraba [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón); Bonilla, El Copey, and Santa Maria de Dota (Basulto).

Bangs Collection: Pózo Azul de Pirrís, Cariblanco de Sarapiquí, Azahar de Cartago, Carrillo, El General and Buenos Aires de Terraba, Tenorio, Bolson (Underwood).

C. H. Lankester Collection: Cachí and El Hogar.

Carnegie Museum: Guápiles, Guácimo, El Hogar, Boruca, Buenos Aires, Peralta (Carriker). Fifteen skins.

This little flycatcher is found in practically all portions of the country from near sea-level up to 4,000 or 5,000 feet. It is very scarce below about 600 feet and above 3,000 feet, its zone of greatest abundance being between 800 and 2,000 feet.

It frequents open woodland, the edges of the forests, scattering trees in pastures and along roadsides, usually being seen rather low down in the trees. It feeds very much like the vireos, but also catches insects on the wing.

Costa Rican specimens vary exceedingly in size from every locality in which they are taken, especially in the size of the bill.

492. *Myiopagis placens accola* Bangs.

*Elainea placens* (not of Sclater, 1859) SCLATER and SALVIN, P. Z. S., 1864, 359 (Panama, critical). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 (Barránca and Guaitíl [J. Carmiol], Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Las Trojas, Grecia, and Monte Redondo). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 148, *part* (Barránca [Carmiol], Tucurríqui [Arcé]). — UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Myiopagis placens* SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 26, *part* (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 31 (Lagarto, Térraba, and Buenos Aires).

*Myiopagis placens accola* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 35 (Boquete, Panama). — RIDGWAY, Birds N. and Mid. Am., IV, 1907, 403 (Nicaragua to Panama; — Costa Rica: Barránca, Guaitíl, Grecia, San Lucas, Bebedéro, Volcan de Miravalles, Santo Domingo de San Mateo, Pózo Azul de Pirrís, Bonílla). — BANGS, Auk, XXIV, 1907, 301 (Boruca [Underwood]).

Bangs Collection: Pózo Azul de Pirrís, El General and Buenos Aires de Térraba, Bebedéro, Bolson, Tenorio, and Coralillo (Underwood).

C. H. Lankester Collection: Bagáces and Cachí.

Carnegie Museum: Bagáces, Boruca, and Buenos Aires (Carriker).

I found this species very abundant in the vicinity of Buenos Aires de Térraba, where they almost entirely frequented the open woodland along the banks of the streams, in company with *Elænia chiriquensis*, *Myiozetetes granadensis*, and *M. texensis columbianus*. They usually perch lower down than the above mentioned species and are not so shy and hard to approach.

The species ranges over practically the whole of the Pacific slope up to 3,000 feet and even higher, where suitable conditions are found, but is most abundant around the Gulf of Nicoya and in the upper Térraba Valley. It is also present in very small numbers on the Caribbean watershed, where Mr. Ridgway secured specimens at Bonilla and Mr. Lankester one at Cachí. I noted nothing in regard to its breeding habits, but presume that the nest may be similar to that of *Elænia*.

493. *Serpophaga cinerea grisea* (Lawrence).

*Serpophaga cinerea* SALVIN, Ibis, 1869, 319 (Costa Rica [Endres]). — BOUCARD, P. Z. S., 1878, 62 (Juan Viñas, ♂ & ♀, very rare). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 103, *part* (Costa Rica [Endres]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 20, *part* (Costa Rica to Ecuador).

*Serpophaga grisea* LAWRENCE, Ann. Lyc. N. Y., IX, 1871, 139 (near San José [Carmioli]). — SALVIN, Ibis, 1874, 315 (critical). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 117 (Navárrro de Cartago).

*Serpophaga cinerea grisea* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 35 (Boquete, Panama). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 397 (near San José, Naránjo, Carrillo, Bonilla, Navárrro, Coliblanco).

U. S. Nat. Museum: Santa Maria de Dota (Basulto).

Bangs Collection: Carrillo (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles (Carriker & Crawford); Ujurrás de Térraba (Carriker). Three skins.

This bird shows little resemblance to a flycatcher, either in appearance or habits. I have never seen it except hopping about on the rocks in a swiftly flowing stream, feeding upon the small insects upon the rocks. It is quite tame and easily approached, but difficult to collect on account of its always being in the midst of a rapid stream. I took an adult female and an immature female in a rocky gorge at Ujurrás de Térraba, at an altitude of about 3,000 feet.

It is apparently found over the whole of the country in small numbers, wherever the conditions are suitable, that is, from about 800 feet upwards to not more than 4,000 feet, but it is most abundant on the Caribbean slope at about 1,000 feet.

494. *Rhynchocyclus cinereiceps* (Sclater).

*Cyclorhynchus cinereiceps* SCLATER, Ibis, Oct., 1859, 443 (Oaxaca, Mexico).

*Rhynchocyclus cinereiceps* SCLATER, Cat. Am. Birds, 1862, 220 (Guatemala). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 395 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 395 (description of nest). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Pózo Azul de Pirrís, Jiménez, Pacuare). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 169 (Angostura [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 10 (Mexico to Panama). — CHERRIE, Expl. Zool. en C. R., 1890-I, 1893, 33 (Lagarto, Boruca, Térraba, and Buenos Aires). — UNDERWOOD, Ibis, 1896, 437 (Miravalles). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 394 (southern Mexico to Panama Railroad; — Costa Rica: Angostura, La Palma de Nicoya, Pózo Azul de Pirrís, Naránjo, Carrillo, Bonilla, Jiménez, Pígres,



Juan Viñas). — BANGS, Auk, XXIV, 1907, 300 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

*Rhynchocyclus sulphureus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 and 146 (Angostura [Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — BOUCARD, P. Z. S., 1878, 63 (San Carlos).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Santo Domingo de San Mateo (Alfaro).

Bangs Collection: Pózo Azul de Pirrís, Juan Viñas, Carrillo, Bolson, Tenorio, Coralillo, El General de Térraba (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles (Carriker & Crawford); Guápiles, Bebedero, Miravalles, Bagáces, El Hogar, Juan Viñas, San Mateo, Esparta, El Pózo de Térraba, Boruca, Buenos Aires (Carriker). Twenty-one skins.

This species ranges over the whole of the Caribbean and Pacific lowlands up to at least 3,000 feet on the eastern slope and 2,000 feet on the western side. It is never very abundant in individuals in any locality, except perhaps in some parts of the Pacific lowlands. I found it common about Esparta and breeding in the first week in June. A great many of the specimens taken (about one-third) have an abnormally shaped bill, which is much compressed laterally, with a very distinct maxillary and mandibular ridge, especially noticeable on the mandible. There are found, however, all gradations between the normal flat and broad bill to the narrowly pointed and ridged bill, but I have not been able to discover their cause.

Many nests of this species were noticed about Esparta, also at El Pózo de Térraba and Pózo Azul de Pirrís. It is invariably the same in shape and material, being made entirely of a peculiar black, hair-like fibre, but from what source it comes I am not able to determine, although it much resembles the fibres found in the stalks of many of the ferns. It is a pouch-shaped, pendant structure, invariably suspended from the drooping tip of a limb, and is about twelve to fourteen inches in length and five inches in diameter at the bottom. The opening is at the bottom, protected by an extension of the side, like an awning, and extending upward over the rim of the cavity of the nest, which is also lined with the same black fibrous material. The eggs are creamy-white, with a slightly rufous tinge, speckled, chiefly about the larger end, with cinnamon-rufous, and with a suffusion of the same color about the larger end. Two eggs are invariably laid. Measurements:  $21 \times 14$  and  $20.5 \times 14$  mm.

495. **Rhynchocyclus marginatus** Lawrence.

*Rhynchocyclus marginatus* LAWRENCE, Proc. Acad. Nat. Sci., Phila., 1868 (published April or May, 1869), 429 (Lion Hill Station, Panama R. R. [M'Leanan]). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 392 (Panama to eastern Costa Rica, Carrillo). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 32 (La Vijagua, Feb. 21 and 25, two specimens [Underwood]).

Bangs Collection: Carrillo, Nov. 24, 1898 (Underwood).

Carnegie Museum: El Hogar, Jan. 21, 1907, ♀; March 17, 1907, ♂ (Carriker).

This is one of the rarities among the flycatchers, not only in Costa Rica, but throughout its range, but five specimens of it ever having been taken in Costa Rica, three by Underwood, which are in Mr. Bangs' collection, and two by myself at El Hogar.

It seems that in Costa Rica it is confined to the Caribbean lowlands, with very likely a continuous range up from Panama, although it has never been taken in intermediate localities. I did not take, or to my knowledge see it in Talamanca.

496. **Craspedoprion brevirostris** (Cabanis).

*Cyclorhynchus brevirostris* CABANIS, in Wiegmann's Archiv. für Naturg. 1847, i, 249.

*Rhynchocyclus brevirostris* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 166 (Irazú district [Rogers], C. R. [Endres and Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 8 (Mexico to Panama). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 33 (Lagarto and Boruca).

*Rhynchocyclus griseimentalis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 112 (published March, 1869) (Dota [J. Carmiol]). — SALVIN, Ibis, 1869, 315 (Costa Rica). — FRANTZIUS, Jour. für Orn., 1869, 315 (Costa Rica).

*Craspedoprion brevirostris* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 388 (southern Mexico to Veragua; — Costa Rica: Dota, Val, Juan Viñas, Rio Naránjo, Pózo Azul de Pirrís, Pózo del Pital, Azahar de Cartago, Irazú). — BANGS, Auk, XXIV, 1907, 300 (Boruca and El Pózo de Térraba [Underwood]).

Bangs Collection: Azahar de Cartago, Juan Viñas, El General de Térraba, Pózo Azul de Pirrís (Underwood).

C. H. Lankester Collection: El Hogar.

Carnegie Museum: Pózo Azul de Pirrís, Juan Viñas, El Pózo de Térraba (Carriker). Eleven skins.

This peculiar bird has a remarkably large and variable range in Costa Rica, being found over both the Caribbean and Pacific lowlands and up on the eastern slope of the mountains of northeastern Costa Rica, as high at least as 5,000 feet. However, it seems to be absent from the north-western portion of the country, no specimens having been taken in Guana-

caste. It is again found high up in the Dota Mountains where the cool humid conditions are similar to those of the higher Caribbean slope.

The nest resembles a bunch of trash hanging from the tip of a limb, small at the top, and increasing in size downward to a diameter of about eight inches at the bottom. The opening is on one side at the bottom, overhung by the material of the nest, and extending upward for about four inches to the rim of the cavity of the nest. I have never seen the eggs.

497. **Platytriccus albogularis** (Sclater).

*Platyrrhynchus albogularis* SCLATER, P. Z. S., 1860, 68 (Pallatanga, Ecuador); Cat. Birds Brit. Mus., XIV, 1888, 67, pl. 8, fig. 2 (Irazú [Rogers]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 6 (Costa Rica to Peru).

*Platyrrhynchus albigularis* BOUCARD, P. Z. S., 1878, 62 (Naváiro).

*Platyrrhynchus cancrominus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (Navarro). — FRANTZIUS, Jour. für Orn., 1869, 306 (Naváiro).

*Platytriccus albogularis* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 211 (critical); Birds N. and Mid. Amer., IV, 1907, 384 (Naváiro, Naránjo, Irazú, Cartago, La Estrella de Cartago, Azahar de Cartago, Cariblanco de Sarapiquí).

U. S. Nat. Museum: Los Reyes, La Lagunaria, and Santa Maria de Dota (Basulto).

Acad. Nat. Sci. Philadelphia: La Estrella de Cartago and Azahar de Cartago (Underwood).

Bangs Collection: Cariblanco de Sarapiquí, Cerro de Santa Maria, Azahar de Cartago, Tenorio, El General de Térraba, Pózo Azul de Pirrís (Underwood).

Fleming Collection: Carrillo and Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Juan Viñas (Carriker). One skin.

This species is found on the Caribbean slope from about 1,500 feet upwards, and in the forests of the central plateau, but is not found on the Pacific slope of central or northern Costa Rica. Apparently it has crossed over to the Dota Mountains (in southwestern Costa Rica) where cool and very humid conditions are similar to those found on the higher Caribbean watershed. I took but one specimen of this species at Juan Viñas, hence know little of the habits of the bird, but I judge that they are practically the same as those of the preceding species.

Mr. Ridgway gives Pózo Azul de Pirrís among the localities for this species, which seems to me to be, if correct, most unusual, for this bird is not found at low altitudes, even on the Caribbean slope, and Pózo Azul is only about 500 feet above sea-level.

498. **Platytriccus cancrominus** (Sclater and Salvin).

- Platyrrhynchus cancrominus* SCLATER and SALVIN, P. Z. S., 1860, 299 (Guatemala). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 66 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 5 (Mexico to Nicaragua). — UNDERWOOD, Ibis, 1896, 437 (Miravalles, Costa Rica).  
*Platytriccus cancrominus* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 211 (critical); Birds N. and Mid. Amer., IV, 1907, 382 (Volcan de Miravalles, Bebedéro, and Pózo Azul de Pirrís).

Acad. Nat. Sci. Philadelphia: Bebedéro (Underwood).

Bangs Collection: Pózo Azul de Pirrís, Bolson, Tenorio (Underwood).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Pózo Azul de Pirrís, Bebedéro, Miravalles, Bagáces, Esparta (Carriker). Seven skins.

This bird is confined entirely to the northern Pacific coast of Costa Rica, thence northward. It has not been taken south of the Rio Grande de Pirrís, and is most abundant in Guanacaste, in the lower Rio Tempisque Valley. It is found, like the other members of the genus, only in the forest, keeping near the ground, perching on low limbs of trees and shrubbery and catching insects on the wing.

499. **Placostomus superciliaris** (Lawrence).

- Platyrrhynchus superciliaris* LAWRENCE, Ibis, April, 1863, 184 (Lion Hill, Panama [M'Leannan]). — Ann. Lyc. N. Y., IX, 1868, 110 (Valsa [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (C. R.). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 68 (no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 6 (Costa Rica to Guiana). — CHERRIE, Expl. Zool. en C. R., 1890-1, 31 (Lagarto and Boruca).  
*Placostomus superciliaris* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 208 (critical); Birds N. and Mid. Amer., IV, 1907, 379 (Valsa, Rio Naránjo, Pózo Azul de Pirrís, Pózo del Pital, Las Trojas, La Concepción de Jiménez, Carrillo). — BANGS, Auk, XXIV, 1907, 300 (Boruca, El Pózo and Paso Real de Terraba [Underwood]).

Bangs Collection: Pózo Azul de Pirrís, Carrillo, La Vijagua, El General de Terraba, Reventazón (Underwood).

C. H. Lankester Collection: La Florida.

Carnegie Museum: Guápiles (Carriker & Crawford); Pózo Azul de Pirrís, Cuábres, Guácimo, El Hogar, El Pózo de Terraba, Boruca, and Peralta (Carriker). Sixteen skins.

This is the smallest and commonest of the Spade-billed Flycatchers in Costa Rica, being found over the whole of the Caribbean and Pacific slopes from sea-level up to about 2,000 feet, occasionally stragglers going

higher on the eastern side. It is never found outside of the thick, dark forest, keeping near to the ground in the shrubbery and low trees. The nest is always placed in an upright fork of a small shrub, usually from four to six feet above the ground. It is a beautifully built and compact structure. I secured a nest with eggs near Jiménez, May 11, 1905. It was situated as stated above, near the edge of a dense piece of jungle, and close beside an old abandoned log-road. It was a cup-shaped structure, made of fine bark fibres, moss, and rootlets, and lined with coarse, black hair-like fibres of one of the common ferns. A tuft of fibres of irregular length trailed from the bottom, and the outer walls were slightly decorated with lichens and spider-webs. The outside diameter was 2.75, the depth 2, inside diameter 1.5, depth 1.25 inches. The two fresh eggs were deep cream-color, with some lilac markings and spots of cinnamon in a wreath about the larger end. Measurements:  $17 \times 13$  and  $17.5 \times 13$  mm.

500. **Perissotriccus atricapillus** (Lawrence).

*Todirostrum ecaudatum* (not of D'Orbigny and Lafresnaye) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica).

[*Orchilus*] *ecaudatus* SCLATER and SALVIN, Nom. Av. Neotr., 1873, 45, *part* (Costa Rica).

*Orchilus atricapillus* LAWRENCE, Ibis, 1875, 385 ("Volcan de Irazu" (?) = Talamanca [Gabb]). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 89 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 17 (Costa Rica).

*Perissotriccus atricapillus* OBERHOLSER, Proc. U. S. Nat. Mus., XXV, 1902, 64 (critical). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 377 (Talamanca, Angostura, Jiménez).

Bangs Collection: Jiménez, Feb., 1891, ♂; June, 1892, ♀ (Underwood).  
Carnegie Museum: El Hogar, Jan. 12, 1907, ♂ and ♀; March 21, ♂ (Carriker).

This is one of the rarest of the flycatchers, never having been taken outside of Costa Rica, and probably there are not more than eight or nine specimens of it in existence. Carmiol secured the first specimen at Angostura, which was recorded by Lawrence under the name of *Todirostrum ecaudatum*. The next was taken by Gabb in Talamanca, and it was from this skin that the bird was described by Lawrence. It was not taken again until 1889, when Alfaro secured a single bird (?) at Jiménez, August 20. In 1891 and 1892 Underwood secured two birds at the same place, and in 1907 I was fortunate to take three specimens at El Hogar, which is only about three miles from Jiménez.

I found the birds in the virgin forest, always near some little creek, where the trees were rather low and open, letting in the sun. I should probably never have seen them had it not been for their peculiar note, for they perch up in the trees at a considerable height. Their call consists of a single thin, piercing note, with a slight rasping quality, and repeated with a very short interval between each note. They sit very quietly when calling, not moving in the least and are almost impossible to see from the ground on account of their exceedingly small size. I heard others calling at different times, but I was never able to find them on account of their having quit calling before I reached the spot. At Barmouth, near the mouth of the Matina river, I also heard one, but could not find it.

Its range seems to be confined to the Caribbean lowlands, extending the whole length of the country, from sea-level up to 1,000 or 1,200 feet, wherever heavy forest is present.

501. **Lophotriccus squamæcristatus minor** Cherrie.

*Euscarthmus squamicristatus* (not *Todirostrum squamæcristatus* Lafresnaye) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 111 (Cervantes [J. Carmiol], Dota [Zeledón], Grecia [F. Carmiol]). — FRANTZIUS, Jour. für Orn. 1869, 307 (Quebrada Honda). — BOUCARD, P. Z. S., 1878, 62 (Juan Viñas). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Naránjo de Cartago, Turrialba, Cervantes, Dota).

*Lophotriccus squamicristatus* SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 87, *part* (Dota [Zeledón], Turrialba, and Tucurríqui [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 16, *part* (Costa Rica to Venezuela).

*Lophotriccus squamicristatus minor* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 337 (Grecia [J. Carmiol]). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 371 (Grecia, Cervantes, Dota, Quebrada Honda, Naránjo, Turrialba, Tucurríqui, Bonilla, Juan Viñas, San Carlos, Cariblanco de Sarapiquí).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), La Lagunaria, and El Copey de Dota (Basulto).

Bangs Collection: Carrillo, La Vijagua, Cariblanco de Sarapiquí, Juan Viñas, El General, Cerro de Santa Maria (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Volcan de Turrialba, 2,000 feet (Carriker & Crawford); La Hondura, Juan Viñas (Carriker). Six skins.

This beautiful little crested species has rather a wide range in Costa Rica, being found in almost every part of the country between the altitudes of 1,500 and 4,000 feet, a few stragglers sometimes being found a little lower or higher. I found it more abundant in the hills above Juan Viñas, near Capalladas, than in any other locality visited. Underwood

also took a good series at La Vijagua, on the Caribbean slope. It is found only in the heavy virgin forest, preferring cool humid conditions. It perches rather low down among the lower limbs of the trees and in the undergrowth, catches its food on the wing, and has a very peculiar, shrill, penetrating note, not loud, yet heard for some distance and very different from that of any other bird which I have ever heard.

502. *Todirostrum schistaceiceps* Sclater.

*Todirostrum schistaceiceps* SCLATER, Ibis, 1859, 444 (Oaxaca, Mexico). — ZELEDÓN, Proc. U. S. Nat. Mus., VIII, 1885, 108 (Costa Rica); An. Mus. Nac. de C. R., I, 1887, 116 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 74 (Mexico to Venezuela). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 13 (no C. R. specimens). — CHERRIE, Expl. Zool. en C. R., 1890-1, 31 (Boruca and Buenos Aires). — RIDGWAY, Birds N. and Mid. Amér., IV, 1907, 367 (Rio Frio, Guaitíl, and Pózo Azul de Pirrís). — BANGS, Auk, XXIV, 1907, 300 (Boruca, Paso Real, and El Pózo de Térraba [Underwood]).

Bangs Collection: Pózo Azul de Pirrís, Guaitíl, Miravalles, La Vijagua, Coralillo, Bolson, Tenorio, Buenos Aires, and El General de Térraba (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, Buenos Aires, Boruca, El Pózo de Térraba, Esparta, San Mateo, Bebedéro (Carriker). Seventeen skins.

This species is confined almost entirely to the Pacific coast region, up to about 2,000 feet, with the exception of the eastern slope in the extreme northern part of the country, where the bird crosses the low continental divide at the boundary line between Costa Rica and Nicaragua and passes down the eastern slope as far as the Rio Frio. Underwood took several specimens at La Vijagua, on the eastern watershed. The bird is most abundant in the southwestern region, from Puntarenas south, especially in the Térraba Valley. Its habits are very similar to those of *T. cinereum*, except that it is oftener found in thick woodland, but never in heavy virgin forest. I did not find any of the nests, nor did I see any nest in the Térraba Valley resembling that of *T. cinereum*, so that evidently this species does not build that type of a nest.

503. *Todirostrum nigriceps* Sclater.

*Todirostrum nigriceps* SCLATER, P. Z. S., 1855, 66, pl. 84, fig. 1 (Santa Marta, Columbia). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (Angostura [J. Carmioll]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 72 (no C. R. specimens). — SALVIN and

GODMAN, Biol. Centr.-Am., Aves, II, 1888, 13 (Costa Rica to Ecuador). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 366 (Angostura, Jiménez, Cariblanco de Sarapiquí, Reventazón, Bonilla).

Bangs Collection: Cariblanco de Sarapiquí and Jiménez (Underwood).  
Carnegie Museum: Guápiles, ♂ (Carriker & Crawford); Guácimo, ♂ (Carriker).

Entirely confined to the Caribbean slope, probably between about 600 and 2,000 feet above sea-level. It is a very rare bird, not only in Costa Rica but throughout its range, probably not more than eight or ten specimens having been taken in Costa Rica. Little is known of its habits. The two birds which I secured were taken in shrubbery in open places, and seemed to have the habits of the succeeding species.

504. *Todirostrum cinereum finitimum* Bangs.

*Todirostrum cinereum* SCLATER, P. Z. S., 1856, 141 (David, Panama). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (Turrialba and Pacuare [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (San José). — BOUCARD, P. Z. S., 1878, 62 (Cartago and San José). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Las Trojas, Pacuare, Jiménez). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 69, *part* (Irazú [Rogers], Bebedéro [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 12, *part* (Mexico to South Brazil). — CHERRIE, Auk, VII, 1890, 233 (San Jose, notes on breeding); IX, 1892, 250 (San José, common resident); Expl. Zool. en C. R., 1890-1, 1893, 31 (Palmar and Buenos Aires). — UNDERWOOD, Ibis, 1896, 437 (Miravalles to Bebedéro). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 364 (southern Mexico to Panama; — Costa Rica: Turrialba, Pacuare, Volcan de Irazú, Cartago, San José, Nicoya, Bebedéro, Miravalles). — BANGS, Auk, XXIV, 1907, 300. *Triccus cinereus* CABANIS, Jour. für Orn., 1861, 242 (Costa Rica [Frantzius and Hoffmann]).

*Todirostrum cinereum finitimum* BANGS, Proc. Biol. Soc. Wash., XVII, 1904, 114 (S. Mexico; coll. E. A. and O. Bangs).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Carrillo (Underwood), Reventazón (Carránza), Jiménez (Cherrie), Pígres (Ridgway), Bonilla (Zeledón).

Bangs Collection: San José, Carrillo, Coralillo, El General de Térraba, Bolson (Underwood).

C. H. Lankester Collection: Guácimo and Sarapiquí.

Carnegie Museum: Guápiles (Carriker & Crawford); Juan Viñas, El Hogar, Bagáces, Buenos Aires de Térraba (Carriker). Sixteen skins.

This is the commonest and most widely distributed *Todirostrum* in Costa Rica, being found over the whole of the lowlands of both coasts and up over the central plateau to at least 4,500 feet. It is commonest



in the Caribbean lowlands, especially in the Santa Clara Valley. It is not found in the heavy forest but in open woodland, among scattered trees and shrubbery, in pastures, and along the edges of streams. I found it breeding abundantly about Guápiles and Guácimo, the nest being usually placed among some vines hanging beside the trunk of some large tree left in a pasture or on the edge of the bananas. They were invariably built in the same manner and of the same sort of material.

Nests were found with fresh eggs from April 11 to July 17. The nest is made almost entirely of green moss with some weed-fibre intermixed, and greatly resembles a bunch of moss hanging from a twig. The nest-cavity is at the bottom, with the opening on one side, shielded by an overhanging curtain of moss, and the whole interior lined with fine weed-fibres and a few hairs. They average about eleven inches in length and two and one-half inches in diameter at the bottom. The eggs are pure white, and usually three in number. Measurements: 10.5 to 11.5 × 15 to 15.5 mm.

505. *Oncostoma cinereigulare* (Sclater).

*Todirostrum cinereigulare* SCLATER, P. Z. S., 1856, 295 (Cordova, Mexico [Sallé]).  
*Oncostoma cinereigulare* SCLATER, Cat. Am. Birds, 1862, 208. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 111 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 307 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Jiménez, Las Trojas, Pózo Azul de Pirrís, Pacuare). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 77 (Mexico to Chiriquí, no C. R. specimens). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888 (no C. R. specimens). — CHERRIE, Expl. Zool. en C. R., 1890-1, 31 (Boruca, Térraba, and Buenos Aires). — UNDERWOOD, Ibis, 1896, 438 (Miravalles). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 358 (Talamanca, Jiménez, Angostura, Pózo Azul de Pirrís, Volcan de Miravalles). — BANGS, Auk, XXIV, 1907, 300 (Boruca and El Pózo de Térraba [Underwood]).

Bangs Collection: Pózo Azul de Pirrís, Miravalles, Bolson (Underwood).

C. H. Lankester Collection: Guácimo, Miravalles.

Carnegie Museum: Guácimo, Rio Sicsola, Cuábre, Miravalles, Bagáces, El Hogar, Buenos Aires (Carriker). Fourteen skins.

This curious little flycatcher is distributed over the whole of the Caribbean and Pacific lowlands, up to about 1,500 feet. It is fond of thick, vine-covered jungle, second-growth scrub, and shrubbery along streams, but does not go into the heavy forest for any distance. Like *Todirostrum*, it catches its food on the wing, darting out from its perch at passing insects.

I found a nest of this species near Guápiles in a lime tree, growing at the edge of a pasture. The birds were around the nest when I first dis-

covered it, but as yet no eggs had been laid. Upon my return several days later I found the nest abandoned and partly destroyed. It was a tiny flattened cup-shaped structure, made of fine grasses and weed-fibres, and lined with vegetable down and a few hairs, and placed in a cluster of small branches on the top of a limb.

506. *Onychorhynchus mexicanus fraterculus* Bangs.

*Muscivora mexicana* (not of Sclater, 1856) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 114 (Aténas). — FRANTZIUS, Jour. für Orn., 1869, 308 (Costa Rica). — BOUCARD, P. Z. S., 1878, 63 (San Ramon). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 396 (La Palma de Nicoya, descr. habits, etc.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 116 (Las Trojas). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 193, *part* (Miravalles and Bebedéro [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1889, 53 (Costa Rican references). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 34 (Lagarto and Terraba, rare). — UNDERWOOD, Ibis, 1896, 438 (Miravalles).

*Onychorhynchus mexicanus* OBERHOLSER, Auk, XVIII, 1901, 194, *part* (crit.).

*Onychorhynchus mexicanus fraterculus* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 86 (Santa Marta, Colombia). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 356 (Nicaragua to Colombia; — Costa Rica: La Palma de Nicoya, Bebedéro, Volcan Miravalles, Atenas, Las Trojas, Pózo Azul de Pirris, San Ramon). — BANGS, Auk, XXIV, 1907, 302 (Boruca, Paso Real, and El Pózo de Terraba [Underwood]).

Bangs Collection: Miravalles, Tenorio, Bolson, and El General de Terraba (Underwood).

Carnegie Museum: Pózo Azul de Pirris, Miravalles, Bagáces, El Pózo de Terraba, Boruca (Carriker). Eight skins.

This handsome flycatcher is found in Costa Rica only on the Pacific lowlands, below 2,000 feet, and is commonest below 1,000 feet, especially in the region of the Gulf of Nicoya. The birds frequent the heavy forest, especially near a stream, and are usually seen in pairs. As a rule they are quiet, and, when sitting motionless, the crest is not shown, lying flat on the nape. When alarmed or in the breeding season the male often utters a loud shrill call, quite similar to that of most species of *Myiarchus*. I did not succeed in finding the nest of this bird, so will append a description of it as given by Mr. M'Leannan (Lawrence, Ann. Lyc. N. Y., VII, 1862, 329).

"The nest, which is placed in very secluded spots, is surrounded by a mass of loose straggling material; when first observed he had no suspicion of its being a bird's nest, but discovered it to be so by seeing the bird enter; inside of the loose grass, etc., is a curious hanging structure, about three

feet in length, large in the centre and decreasing in size toward each end; the entrance is on the side at the largest diameter, where the nest proper is placed, this is very perfect in form; the number of eggs invariably laid was two. The eggs appear small for the size of the bird; they measure, axis,  $13/16$  in., diameter,  $10/16$  in.; the ground color is of a dull pale reddish-white, marked for half the length with dull reddish-brown, lighter at the end, which gives the appearance of a confused broad belt just back of the broadest diameter; the smaller end is irregularly spotted and streaked with the same color."

507. *Copurus leuconotus* Lafresnaye.

*Copurus leuconotus* LAFRESNAYE, Rev. Zool. 1842, 335. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 110 (San José and Pacuare [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 306 (Turrialba). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 51 (Tucurríqui [Arcé], San José [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 4. — RIDGWAY, Birds N. and Mid. Am., IV, 1907, 351 (southern Honduras to Cayenne; — Costa Rica: Rio Frio, Talamanca, Jiménez, Pacuare, Tucurríqui, Turrialba, Carrillo, Bonilla, and San José).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón).

Bangs Collection: Carrillo (Underwood).

C. H. Lankester Collection: Guácimo and Sarapiquí.

Carnegie Museum: Guápiles (Carriker & Crawford); Guácimo, Rio Sicsola, El Hogar (Carriker). Twelve skins.

This curious little flycatcher is confined almost entirely to the Caribbean slope, from near sea-level up to about 2,000 feet in comparative abundance, occasionally straggling to higher altitudes. Lawrence records a bird from San José, but I think this a very doubtful record, some mistake having been made in the labelling of the specimen. The birds frequent the edge of clearings, open woodland, and the edges of streams. They are always to be seen around the new clearings on the banana-plantations, where many broken off stubs are left, containing old woodpecker holes, in which this bird builds its nest. I noted many such nests, but always in an old stub so slender and rotten that to climb it was an impossibility. The birds are always seen in pairs, usually perched on some broken stump or limb, and catch their food on the wing like *Tyrannus* and *Myiarchus*.

## Family OXYRUNCIDÆ.

508. *Oxyruncus cristatus frater* (Sclater and Salvin).

*Oxyrhynchus flammiceps* (not of Temminck) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 106 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Orósi).

*Oxyrhamphus frater* SCLATER and SALVIN, P. Z. S., 1868, 326 (Calovevora, Panama); Exotic Ornith., pt. IX, pl. 66 (2 figs.). — SCLATER, Cat. Birds Brit. Mus., XIV, 1888, 281 (Costa Rica [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1888, 2 (Costa Rican references).

*Oxyruncus cristatus frater* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 334 (Panama and Costa Rica: San Carlos, Bonilla, Buena Vista, Orósi, San José).

U. S. Nat. Museum: Santa Maria de Dota (Basulto).

Bangs Collection: San Carlos, La Vijagua (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

This is a very rare bird in Costa Rica, and not enough specimens have been taken to satisfactorily determine its range. With the exception of the one record from San José and the one from the Dota Mountains, all specimens have been taken on the Caribbean watershed from 1,000 feet up to 3,000 feet. Since it is a bird found only in the humid forests I judge that it is very rare on the Pacific slope, or wanting, except in the Dota Mountains and the Cerro de Santa Maria, where conditions are very similar to those on the Caribbean watershed.

## Family MIMIDÆ.

509. *Dumetella carolinensis* (Linnæus).

*Muscicapa carolinensis* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 328 (Virginia; based on the Catbird, Catesby, Nat. Hist. Carolina, I, 66, pl. 66).

*Galeoscoptes carolinensis* CABANIS, Mus. Hein., I, 1850, 82. — RIDGWAY, Birds N. and Middle Amer., IV, 1907, 218 (temperate North America in general, southward in winter through southern U. S., the Lesser Antilles, eastern Mexico and Central America to Panama).

*Dumetella* S. D. W., A. O. U. Comm., Auk, XXV, 1908, 385.

C. H. Lankester Collection: Guácimo, January, 1905, and Sept. 11, 1905.

I am not able to find any published record of the taking of the Catbird in Costa Rica. The first record of which I have any knowledge is the taking of two specimens by myself at Cauita, on the Caribbean coast, Feb. 15, 1904. Both were males. These skins were lost, together with all others collected at that point. The only other specimen taken was the one recorded above as taken by Mr. Lankester at Guácimo. I saw several birds at El Hogar during the winter of 1906-7, but did not shoot

them. I think that the bird is a regular winter visitor to the eastern coast, but does not go far inland, and for that reason has not been taken before.

510. *Mimus gilvus columbianus* (Cabanis).

*Mimus columbianus* CABANIS, Mus. Hein., I, 1851, 82 (Colombia and Venezuela).

*Mimus gracilis* CABANIS, Jour. für Orn., 1860, 410 (Costa Rica, one specimen [Hoffmann]). — LAWRENCE (not of Cabanis), Ann. Lyc. N. Y., IX, 1868, 92 (Costa Rica).

*Mimus gilvus* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 544 (El Zarcéro, Costa Rica, alt. 7000 feet; critical); XIV, 1891, 473 (do.).

*Mimus gilvus columbianus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 236 (Colombia to Costa Rica: El Zarcéro).

A single immature specimen of this bird was taken by Hoffmann and recorded by Cabanis (Jour. für Orn., 1860, 411), who called it *gracilis*. In addition to this bird we have a specimen recorded by Mr. Ridgway from El Zarcéro. It certainly is not a regular bird in Costa Rica, probably only straggling so far north at intervals. If it were a breeding bird of regular occurrence on the central plateau region, it would certainly have been taken by other collectors and in greater numbers.

Family TURDIDÆ.

511. *Myadestes melanops* Salvin.

*Myiadestes melanops* SALVIN, P. Z. S., 1864 (pub. April, 1865), 580, pl. 36 (Tucurríqui, Costa Rica [Arcé]; coll. Salvin and Godman). — BAIRD, Review Amer. Birds, 1866, 426 (Dota and Rancho Redondo [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (La Palma [Frantzius], San José [J. Carmiol], Navarro [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 266 (Cartago and Orósi; habits). — BOUCARD, P. Z. S., 1878, 50 (Navarro). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 104 (Naránjo de Cartago, Zarcéro de Alajuela, Birris de Cartago, Rio Súcio, Rancho Redondo).

*Myiadectes melanops* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 42 (Volcan de Irazú). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 376 (Costa Rica [Van Patten]).

*Myadestes melanops* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 171 (highlands of Chiriquí and Costa Rica: Tucurríqui, Dota Mts., Rancho Redondo, La Palma, Navarro, San José, Volcan de Irazú, Barranca, Cervántes).

U. S. Nat. Museum: Coliblanco (Ridgway), La Lagunaria de Dota (Bassulto).

Bangs Collection: Cariblanco de Sarapiquí, Azahar de Cartago, La Vijagua (Underwood).

C. H. Lankester Collection: Vara Blanca.

Carnegie Museum: Volcan de Irazú, Carrillo, La Hondura, Ujurrás de Térraba (Carriker). Seven skins.

This beautiful songster is confined to the highlands, but is generally distributed over the whole of the country above 2,500 feet, even going down as low as 1,200 or 1,500 feet on the Caribbean slope (Carrillo). It seems to be most abundant on the eastern edge of the plateau region and upper Caribbean slope, preferring the cool humid forests to be found in that region. It is a charming songster and much prized by the people of the country as a cage-bird, seeming to thrive well in captivity. The bird is extremely hard to locate in the forest by means of its song, which has decided ventriloquistic qualities. The native name given on account of its beautiful song is "El Rey do los Jilgueros," literally meaning the "King of the Linnets."

512. *Planesticus nigrescens* (Cabanis).

*Turdus nigrescens* CABANIS, Jour. für Orn., 1860 (pub. Jan., 1861), 324 (Volcan de Irazú [Hoffmann]; coll. Berlin Mus.). — SCLATER, Cat. Am. Birds, 1862, 358 (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 91, Volcan de Irazú [Cooper], Dota [F. Carmiol]. — FRANTZIUS, Jour. für Orn., 1869, 290 (Volcan de Irazú). — BOUCARD, P. Z. S., 1878, 50 (Volcan de Irazú, 6,000 to 10,000 feet; descr. nest and eggs). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 25, pl. 4.

*Merula nigrescens* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 104 (Volcan de Irazú). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 242 (Volcan de Irazú). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (summit Volcan de Irazú [Nutting]).

*Planesticus nigrescens* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 124 (high mountain summits of Chiriquí, Panama, and Costa Rica: Vols. de Póas, de Irazú, de Turrialba, Dota, Rancho Redondo).

U. S. Nat. Museum: Las Vueltas de Dota (Basulto).

Bangs Collection: Azahar de Cartago, Volcan de Irazú, and Escazú (Underwood).

C. H. Lankester Collection: Volcanoes de Irazú, Póas, and Turrialba.

Carnegie Museum: Volcanoes de Irazú and Turrialba (Carriker). Five skins.

This species is confined entirely to the high mountain-tops, not being taken below 7,000 feet, and is most abundant about 9,000 feet on the high volcanoes. It is one of the commonest birds to be seen around the summits of Irazú and Turrialba just below timber-line, but also frequents in considerable numbers the scrub above timber-line. Its habits and song are strikingly like those of our American Robin, *P. migratorius*, the song being almost indistinguishable, and to further strengthen the relationship, their nests and eggs are also the same. I found it breeding on the Volcan de Irazú early in April, taking a nest on the 12th containing two

partly incubated eggs. The nest is constructed largely of grass and mud, and placed in the fork of a tree about twenty feet from the ground. The eggs are pale blue, the same color as those of the American Robin, and measure  $35 \times 24$  and  $34 \times 23$  mm.

### 513. *Planesticus plebejus* (Cabanis).

*Turdus plebejus* CABANIS, Jour. für Orn., 1860 (pub. Jan., 1861), 323 (Costa Rica [Frantzius]; coll. Berlin Mus.). — FRANTZIUS, Jour. für Orn., 1869, 290 (Costa Rica).

*Turdus plebeius* SCLATER, Cat. Am. Birds, 1862, 358 (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 91 (Dota, San José, and La Palma [Frantzius], Grecia and Cervantes [J. Carmiol]). — BOUCARD, P. Z. S., 1878, 50 (Navarro). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 17 (Volcan de Irazú [Rogers]). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 215.

*Merula plebeia* RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (Irazú [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 104 (Zarcéro de Alajuela, Volcan de Irazú).

*Planesticus plebejus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 122 (highlands of Panama and Costa Rica: San José, Vols. de Irazú, de Turrialba, de Póas, Navarro, Dota, El Zarcéro, Barranca, La Palma de San José, Cervantes, Grecia, Coliblanco).

U. S. Nat. Museum: Las Vueltas de Dota (Basulto).

Bangs Collection: Volcan de Irazú and San Pedro (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Tierra Blanca, Volcan de Irazú, La Hondura, and Ujurrás de Terraba (Carriker). Eighteen skins.

This thrush is found throughout the highlands of the whole of Costa Rica, between the altitudes of 3,000 and 7,000 feet, but is most abundant on the Caribbean watershed at about 4,000 or 5,000 feet. It is rarely, if ever, taken above 7,000 feet. It inhabits the forest, frequenting the more open parts, where the trees are large and there is not much thick jungle. Its habits are quite like those of *P. nigrescens*, or *P. migratorius*.

### 514. *Planesticus grayi casius* (Bonaparte).

*Planesticus casius* BONAPARTE, Compt. Rend., XLI, 1855, 657 (Panama; type in Brit. Mus.).

*Turdus grayi* CABANIS, Jour. für Orn., 1860, 323 (Costa Rica [Frantzius, Hoffmann, and Ellendorf]). — BAIRD, Review Am. Birds, 1864, 26, *part* (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 91 (San José and Barranca [J. Carmiol], Quebrada Honda [Frantzius], Jour. für Orn., 1869, 290 (Lepanto, Gulf of Nicoya). — BOUCARD, P. Z. S., 1878, 50 (San José; crit.; habits;

descr. nest and eggs). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 18, *part* (Costa Rican references). — UNDERWOOD, Ibis, 1896, 432 (Miravalles). — ALFARO, Paginas Illustrades, I, 1904, 439 (Costa Rica; habits, etc.).

*Turdus grayii* SEEBOHM, Cat. Birds Brit. Mus. V, 1881, 219, *part*.

*Merula grayi* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 386 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (Irazú [Nutting]); 499 (San José [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 104 (Cartago, San José, Alajuéla, Las Trojas, Santa Maria de Dota, Zarcéro de Alajuéla, Monte Redondo). — CHERRIE, Auk, VIII, 1891, 274 (San José; habits; song; descr. nest and eggs); Expl. Zool. en C. R., 1890-1, 1893, 3 (Boruca and Buenos Aires).

*Planesticus grayi casius* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 120 (southeastern Honduras to Panama; — Costa Rica: San José, Barránca, Quebrada Honda, Lepanto, Volcan de Miravalles, La Palma de Nicoya, Pígres, Volcan de Irazú, Coliblanco). — BANGS, Auk, XXIV, 1907, 304 (Boruca [Underwood]).

U. S. Nat. Museum: Guayábo and San José (Ridgway and Zeledón); Santa Maria de Dota (Basulto).

Bangs Collection: San José, Carrillo, Buenos Aires (Underwood).

Carnegie Museum: Juan Viñas, Volcan de Irazú (8,000 ft.), Guápiles, Miravalles (Carriker). Eight skins.

This is the common thrush of Costa Rica, ranging over the whole of the country up to at least 8,000 feet, except the lowlands of the Caribbean below 700 feet. It is not common nor a regular resident on the lowlands of the Pacific, but specimens have been taken in several places at near sea-level. On the Caribbean lowlands it was fairly common around Guápiles (800 feet), but with the exception of one or two pairs I never saw it below that point. It reaches its greatest abundance on the central plateau, among the farms and coffee-plantations of that region. Its song is pretty, much resembling that of our Robin, *P. migratorius*, and like that bird it is found about the houses, gardens, and farms, more than in the less settled districts.

I took a nest on the Volcan de Irazú, at an altitude of about 8,000 feet, on April 16, 1902, which contained three badly incubated eggs. The nest is large and bulky, made of moss and mud and lined with roots and grass. It was placed in the thick top of a tree about thirty feet from the ground, and just beside a house. The eggs are pale blue, very thickly speckled, spotted, and blotched with chestnut-rufous, heavier about the larger end, and mixed with a few lilac markings. Measurements: 29.5×22; 30.5×22; 29×22 mm.



515. *Planesticus obsoletus* (Lawrence).

*Turdus obsoletus* LAWRENCE, Ann. Lyc. N. Y., VII, 1862, 470 (Lion Hill, Panama [M'Leannan]); IX, 1868, 91 (Cervántes, April, 1867 [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 290 (Orósi and Volcan de Póas). — SALVIN, Ibis, 1869, 312 (critical). — BOUCARD, P. Z. S., 1878, 50 (Juan Viñas, one specimen). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 19 (Costa Rican references). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 218.

*Merula obsoleta* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 104 (Zarcéro de Alajuéla, Siquirris, Naránjo de Cartago).

*Planesticus obsoletus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 114 (highlands of Costa Rica to western Ecuador; — Costa Rica: Cervántes, Orósi, Volcan de Póas, Guapiles, El Zarcéro, Tuís).

Bangs Collection: Juan Viñas (Underwood).

Carnegie Museum: Guápiles, ♂ (Carriker & Crawford); Juan Viñas, ♂, 2 ♀'s (Carriker).

This is one of the rarest, if not *the* rarest, of the Costa Rican thrushes. It is confined to the Caribbean slope, ranging between 1,000 and 4,000 feet, but seems to be most abundant at about 3,000 feet. It is found only in the heavy forest, and all three of the birds which I secured were taken low down, one being flushed from the ground.

516. *Planesticus tristis leucauchen* (Sclater).

*Turdus leucauchen* SCLATER, P. Z. S., 1858, 447 (Guatemala). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 91, *part* (Navárrro [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 290, *part* (Costa Rica). — BOUCARD, P. Z. S., 1878, 50 (Orósi).

*Planesticus tristis leucauchen* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 111 (northern and Central Guatemala to central Costa Rica (Santa Maria)).

U. S. Nat. Museum: Santa Maria de Dota (Basulto); Guayábo (Ridgway and Zeledón).

Bangs Collection: Tenorio and La Vijagua (Underwood).

Carnegie Museum: Volcan de Irazú and Miravalles (Carriker). Three skins.

The distribution of this and the succeeding form is rather a complicated matter, for both birds are found together in several localities. I suppose that this is due to the narrowing of the continental divide, where the two forms, naturally inhabiting each slope, come together in the highlands, but it seems to be always the eastern form which encroaches upon the range of the western. For example, eastern birds are found at Santa Maria de Dota, Miravalles, and Tenorio, all of which localities are decidedly on the western slope of the continental divide. Some of the birds from Tenorio also show decided signs of intergradation, as if the birds

interbred there. At all events more material is necessary to satisfactorily settle the exact status of these two birds in Costa Rica.

Both races of *P. tristis* have about the same habits, inhabiting the heavy forest, much like *P. obsoletus* and *plebejus*, and seem to be rare, except in a few localities.

517. ***Planesticus tristis cnephosa*** (Bangs).

*Turdus leucauchen* BAIRD, Review of Am. Birds, 1864, 24, *part* (Dota Mts., Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 91, *part* (Navárrro<sup>1</sup> [Cooper], Dota Mts. [F. Carmiol]).

*Turdus tristis* UNDERWOOD, Ibis, 1896, 432 (Volcan de Miravalles).

*Turdus tristis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 15, *part* (Dota Mts. and Navárrro, Costa Rica). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 211, *part* (Costa Rica).

*Merula tristis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 104 (Santa Maria de Dota and Pózo Azúl de Pirrís). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 2 (Boruca).

*Merula leucauchen cnephosa* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 92 (Chiriquí).

*Planesticus tristis cnephosa* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 110 (Pacific slope of Central America; Costa Rica: Barránca, Dota, Santa Maria, Navárrro<sup>1</sup>). — BANGS, Auk, XXIV, 1907, 330 (Boruca, large series [Underwood]).

U. S. Nat. Museum: El Copey and Santa Maria de Dota (Basulto).

Bangs Collection: El General de Térraba and Alajuéla (Underwood).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Boruca (Carriker). Two skins.

According to Mr. Ridgway, this race of *P. tristis* is confined to the Pacific slope, and all the specimens which I have seen confirm that statement. Underwood took a series of forty-four skins in the Boruca region in 1906, but I found it very scarce there the following year, evidently with good reason. It is very probable that in the extreme northwestern part of the country, the eastern race is found in company with the western, the divide there being so low that the birds pass back and forth.

518. ***Zeledonia coronata*** Ridgway.

*Zeledonia coronata* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1889, 538 (Volcan de Póas, Costa Rica, Nov. 23, 1888 [Alfaro]; coll. U. S. Nat. Mus.). — PYCRAFT,

<sup>1</sup> In "Birds of N. and Middle America," Mr. Ridgway places the locality, Navárrro, under this subspecies, which was probably done in ignorance of the true location of that place. It is near the Reventazón River below Cartago, and decidedly on the Caribbean slope, so that specimens of *P. tristis* taken there would undoubtedly be the eastern form, *P. t. leucauchen*.

Ibis, 1905, 1-24, pls. 1 and 2 (on systematic position). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 71 (high mountain peaks of Chiriquí and Costa Rica: Volcan de Póas and Volcan de Irazú). — BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 28 (Volcan de Irazú [Underwood]; large series of specimens). *Zeledonia insperata* CHERRIE (MS. name) RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 72 (footnote). — BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 28, *in text* (crit.).

Fleming Collection: Escazú and Volcan de Irazú (Underwood).

Carnegie Museum: Volcan de Irazú, La Hondura, Ujurrás de Térraba, and Volcan de Turrialba (Carriker). Six skins.

Found wherever there are heavy, humid forests above an altitude of 5,000 feet, but it is most abundant on the higher peaks, at an elevation of from 8,000 to 10,000 feet. (For description of habits, song, etc., see introduction, page 332.)

519. ***Hylocichla fuscescens fuscescens*** (Stephens).

*Turdus fuscescens* STEPHENS, Gen. Zool., X, i, 1817, 182 (based on *Turdus mustelinus* Wilson, not of Gmelin). — (?) CHERRIE, Auk, VII, 1890, 337 (San José, Costa Rica, Oct. 14, 1889).

*Hylocichla fuscescens* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 166.

*Hylocichla fuscescens fuscescens* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 64 (eastern North American, wintering in Cuba and coast of Yucatan and from Costa Rica and Panama to Colombia, Guiana, and Brazil; — Costa Rica: San José, October).

Carnegie Museum: Rio Sicsola, Oct. 10, 1904 (Carriker). One skin.

This is probably the rarest of the thrushes wintering in Costa Rica, there being but one other record known, besides that of the ♀ taken by myself in the lowlands of Talamanca.

520. ***Hylocichla aliciae aliciae*** (Baird).

*Turdus aliciae* BAIRD, Birds N. Amer., 1858, 217. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 91 (San José [Frantzius]). — BAIRD, Rev. Am. Birds, 1864, 21 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 289 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 12 (Costa Rican references).

*Hylocichla aliciae* RIDGWAY, Proc. Acad. Nat. Sci. Phila., 1869, 127, *in text*; Birds N. and Mid. Amer., IV, 1907, 59 (eastern and northern North America, south in winter to West Indies, lower Central America, and northern South America; — Costa Rica: San José, etc.).

Fleming Collection: Azahar de Cartago (Underwood).

Carnegie Museum: Rio Sicsola, Oct. 7, 1904 (Carriker). One skin.

Evidently very rare in Costa Rica, but few records being known. It is also found in both the lowlands and the highlands.

521. *Hylocichla ustulata swainsoni* (Cabanis).

*Turdus swainsonii* CABANIS, Fauna Per., 1845-46, 187. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 91 (Barránca, Frailes, and Cervántes [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 289 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 10 (Costa Rican references).

*Turdus ustulatus* UNDERWOOD, Ibis, 1896, 432 (Miravalles).

*Turdus ustulatus swainsonii* CHERRIE, Auk, VII, 1890, 337 (San José, Nov. 7, 1887 [Alfaro]).

*Hylocichla ustulata swainsonii* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 55 (North America in general, south in winter over whole of Mexico and Central America to Peru). — BANGS, Auk, XXIV, 1907, 304 (Boruca and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Bonilla, April, 1908 (Ridgway and Zeledón); Coliblanco, April, 1905 (Ridgway); Santa Maria de Dota, April, 1908 (Basulto).

Bangs Collection: Cerro de Santa Maria, Dec.; San José (Underwood).

Carnegie Museum: Volcan de Irazú, April 15, 1902; Tierra Blanca, April 11, 1902; Rio Sicsola, Oct. 7 and 8, 1904; La Hondura, Sept. 27, 1905 (Carriker). Six skins.

A common winter visitor in Costa Rica, and found in the lowlands as well as the highlands. They are usually taken in the thick forest.

522. *Hylocichla mustelina* (Gmelin).

*Turdus mustelinus* GMELIN, Syst. Nat., I, pt. 2, 1788, 817 (New York). — UNDERWOOD, Ibis, 1896, 432 (Miravalles, one specimen).

*Hylocichla mustelina* RIDGWAY, Proc. U. S. Nat. Mus., III, 1880, 166; Birds N. and Mid. Amer., IV, 1907, 35 (eastern North America, south in winter through eastern Mexico and Central America to Costa Rica: Miravalles).

C. H. Lankester Collection: Tuís, Feb. 6, 1907.

Carnegie Museum: Peralta, Nov. 9, 1907 (Carriker). One skin.

The first and only published record we have for the Wood Thrush in Costa Rica is that cited above, by Underwood, who took one bird at Miravalles, probably in 1895. The bird taken by myself at Peralta was in the thick jungle, feeding on the ground, whence it was flushed, alighting on a low limb. I saw no others.

523. *Catharus gracilirostris gracilirostris* Salvin.

*Catharus gracilirostris* SALVIN, P. Z. S., 1864, 580 (Volcan de Irazú [Arcé]); 1866, 69 (Volcan de Irazú). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 90 ("San Mateo" (?) [J. Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 289 (Costa Rica). — BOUCARD, P. Z. S., 1878, 50 (Volcan de Irazú). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 6, pl. 1, fig. 1 (Volcan de Irazú [Rogers]). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 292 (no specimens in Brit. Mus.).

*Catharus gracilirostris gracilirostris* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 32 (high mountains of Costa Rica: Rancho Redondo, Volcan de Póas, Volcan de Irazú, Volcan de Turrialba, Rancho de Rio Jiménez, San Mateo <sup>1</sup>).

U. S. Nat. Museum: Las Vueltas de Dota (Basulto).

Bangs Collection: Volcan de Irazú (Underwood).

Carnegie Museum: Volcan de Irazú, Volcan de Turrialba, Ujurás de Térraba (Carriker). Eleven skins.

This aberrant *Catharus* is found only in the very high mountains of Costa Rica from 7,000 to 10,000 feet above sea-level, wherever there are dense, humid forests. Although their natural abode is in the forest, they seem to have adapted themselves to the changed conditions on many parts of the Volcanoes Irazú and Turrialba, where the forest has been removed to make pastures, but where some of the trees have been left scattered about. Here the birds may be seen hopping over the short grass, or perched on the top of a stump or low limb of a tree. They have a very sweet song, though rather weak, and as a rule do not sing except at the beginning of the breeding season.

I found them breeding very abundantly on the Volcan de Irazú, beginning about the middle of April. Six nests were found between April 16 and 18, 1902, all containing two eggs, of which some were fresh and others slightly incubated. This species also builds its nest almost entirely of moss, and entirely out of proportion to the size of the bird, it being usually about six inches in diameter each way, and with a very small cavity in the top, lined with hairs and rootlets. Almost without exception the nests were placed in a low shrub (about three to six feet from the ground) in a thicket beside a road or on the edge of the forest, but never within the thick forest itself. The eggs are "robin's-egg" blue, more or less thickly speckled and dotted with reddish-brown or deep chestnut, usually with a heavier wreath or cap of this color at the larger end, although rarely speckled evenly over the entire surface. Measurements: 20.5 to 23 × 15 to 16 mm.

#### 524. *Catharus griseiceps* Salvin.

*Catharus griseiceps* SALVIN, P. Z. S., 1866, 68, 69 (Santa Fé de Veragua; coll. Salvin and Godman). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 6, pl. 1, fig. 2 (Panama). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 287 (Panama). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 32 (Panama). — BANGS, Auk, XXIV, 1907, 304 (Boruca, Paso Real, and Barranca de Térraba [Underwood]).

<sup>1</sup> This locality is without question an error. San Mateo has an altitude of only about 1,500 ft., while this bird is rarely taken below 7,000 ft.

Bangs Collection: El General de Térraba (Underwood).

Carnegie Museum: Boruca (Carriker). Four skins.

Mr. Underwood was the first collector to add this Panaman thrush to the Costa Rican ornis, taking it at Boruca in April, 1906. It is rather peculiar that Mr. Cherrie did not take it there in 1890-1, but he probably mistook the song for that of *C. melpomene*, which it greatly resembles, and since they are so exceedingly shy, he did not bother to search for them. I found them fairly common in the second-growth scrub around Boruca but very rare at Buenos Aires. They were singing a great deal still (in July), and it was only by hearing the song that the birds could ever be located, and even then not more than one bird out of six would be secured, so wary were they.

525. ***Catharus melpomene costaricensis*** Hellmayr.

*Catharus melpomene* (not *Turdus melpomene* Cabanis) CABANIS, Jour. für Orn., 1860, 322 (Costa Rica [Frantzius, Hoffmann, and Ellendorf]).—BAIRD, Rev. Am. Birds, 1864, 7 (San José).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 90 (Quebrada Honda [Frantzius], San José [J. Carmiol], Grecia [F. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 289 (over the whole table-land of San José; breeds in April).—BOUCARD, P. Z. S., 1878, 50 (San José and Cartago; habits and song).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 2, *part* (Volcan de Irazú).—SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 288 (no Costa Rican records).—CHERRIE, Auk, VIII, 1891, 272 (San José; habits, breeding, song); Proc. U. S. Nat. Mus., XIV, 1891, 517 (San José; critical).

*Catharus melpomene costaricensis* HELLMAYR, Jour. für Orn., 1902, 45 (Costa Rica; coll. von Berlepsch).—RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 31 (lower slopes of the mountains of Costa Rica: Grecia, San José, Cartago, Navarro, Quebrada Honda, Monte Redondo).

Bangs Collection: Escazú, Carrillo, Azahar de Cartago (Underwood).

C. H. Lankester Collection: San Vicente.

Carnegie Museum: Juan Viñas and Tierra Blanca (Carriker); San Pedro de San José (Underwood). Three skins.

This thrush is found over the whole of the lower plateau region, but does not go below about 3,000 feet on the eastern side and probably to about 2,000 on the Pacific slope. It is abundant in the valleys of San José and Cartago, but more especially on the San José side of the divide. The birds are very shy and retiring and are rarely seen by the ordinary observer, but always make their presence known by their sweet song at the beginning of the breeding season. Mr. Cherrie has given a very complete account of the habits and breeding of this bird, to which I can add nothing (Auk, 1891, 272).

526. *Catharus frantzii frantzii* Cabanis.

*Catharus frantzii* CABANIS, Jour. für Orn., 1860, 323 (Volcan de Irazú, Costa Rica [Frantzius]). — BAIRD, Rev. Am. Birds, 1864, 9 (Costa Rica). — SALVIN, P. Z. S., 1866, 69, *part* (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 90 (San José [Frantzius], Rancho Redondo [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 289 (Potrero Cerrado, La Palma). — BOUCARD, P. Z. S., 1878, 50 (Navarro). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (Irazú [Nutting]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1878, 4 (Costa Rican references). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 290 (Costa Rica). — ZELEDÓN, Proc. U. S. Nat. Mus., VIII, 1885, 104 (Costa Rica); An. Mus. Nac. de C. R., I, 1887, 104 (Volcan de Irazú).

*Catharus frantzii frantzii* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 28 (Volcan de Chiriquí, Panama, and Costa Rica: Volcanoes de Irazú and Turrialba, La Estrella de Cartago, San José, La Palma de San José, Rancho Redondo, Potrero, Cerrado, Navarro).

U. S. Nat. Museum: Coliblanco (Ridgway and Zeledón); Barba (Alfaro); El Copey, La Lagunaria, Las Vueltas and Santa Maria de Dota (Bassalto).

Bangs Collection: Azahar de Cartago, Escazú, La Hondura (Underwood).

C. H. Lankester Collection: Vara Blanca de Sarapiquí.

Carnegie Museum: Volcan de Irazú, Ujurrás de Térraba (Carriker).

Three skins.

This species is found a little higher up than the succeeding, although their ranges overlap for a short distance. It seems to be present over the whole of the higher portions of the country, wherever an altitude of about 6,000 feet is reached, although specimens have been taken as low down as 5,000 feet, but it does not reach timber-line on the high volcanoes, being very rarely seen in company with *C. gracilirostris*, which occupies a still higher range. They are not common anywhere, and only an occasional bird is picked up, although they may be more abundant than appears on account of their extreme shyness. They are silent, solitary, and seek out the dark cool ravines in the heavy forest. I took two nests on the Volcan de Irazú, April 13 and 14, 1902, each containing two eggs, one set being quite fresh and the other slightly incubated. The nest, like that of *C. mexicanus fumosus*, is made entirely of green moss, but lined with fine grass and rootlets. It is very large and bulky for the size of the bird, but the cavity of the nest is small. They were both placed on sprays of bamboo hanging over the side of a deep ravine, and about seven feet from the ground. The eggs are pale blue, thickly speckled and blotched with cinnamon-rufous and lilac, thickest about the larger end, in one egg forming a cap of rufous and lilac. Measurements: 24.5 to 25.5×18 to 19 mm.

527. *Catharus fuscater hellmayri* Berlepsch.

*Catharus fuscater* (not *Myioturdus fuscater* Lafresnaye) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 90 (Cervántes [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 289 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, II, 1879, 5, *part* (Costa Rican references). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 285, *part* (no Costa Rican record). — RIDGWAY, Proc. U. S. Nat. Mus., IV, 1881, 333 (La Palma, Costa Rica; descr., critical). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 104 (Jiménez and Río Súcio).

*Catharus fuscater hellmayri* BERLEPSCH, Orn. Monatsber., X, 1902, 69 (Chiriquí, Panama; coll. Berlepsch). — RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 24 (highlands of Costa Rica and Chiriquí; — Costa Rica: Cervántes, La Palma de San José, Coliblanco, Pascua (not "Cuscu").

U. S. Nat. Museum: Río Súcio (Cooper); Santa María de Dota (Basulto).  
Bangs Collection: Cariblanco de Sarapiquí, Carrillo, Tenorio (Underwood).

Carnegie Museum: Volcan de Irazú; La Hondura, Juan Viñas (Carriker); fourteen specimens; Cariblanco de Sarapiquí (Underwood). Six specimens.

This *Catharus* occupies the higher portions of the range of *C. mexicanus fumosus*, mingling with that species to some extent, but while *mexicanus* is most abundant at about 2,000 feet, this bird is commonest at about 4,000 feet. Its range is the same as that of the following species, except that it is also found in small numbers in the Dota Mountains, and extends down the Caribbean slope the whole length of the country. Like *mexicanus*, it is found only in the heavy forest.

I secured a nest of this species at Juan Viñas, May 20, 1907, containing two fresh eggs. The female was incubating, and secured when flushed. The nest is not so pretty a structure as that of *mexicanus*, being constructed of leaves, moss, and weed-stems, and lined with fine weed-fibres and grass. It was placed in a low bush in the heavy forest. The eggs are pale blue, thickly speckled and dotted and blotched over the entire surface with light chestnut-rufous. Measurements: 25×18 mm.

528. *Catharus mexicanus fumosus* (Ridgway).

*Malacocychla mexicanus* BONAPARTE, Compt. Rend., XLIII, 1856, 998 (Jalapa, Vera Cruz, Mexico).

*Catharus mexicanus* SALVIN, P. Z. S., 1866, 69 (Tucuríqui [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 90 (Costa Rica [Arcé]; coll. O. Salvin). — FRANTZIUS, Jour. für Orn., 1869, 289 (Costa Rica). — SEEBOHM, Cat. Birds Brit. Mus., V, 1881, 286, *part* (no Costa Rican specimens). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 517 (Jiménez, Aug., 1886 [Alfaro]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 6, *part*, Pl. 2, fig. 1 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 432 (Miravalles).



*Catharus fumosus* RIDGWAY, Proc. U. S. Nat. Mus., X, 1888, 505 (Costa Rica, Oct. 20, 1884 [Zeledón]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 104 (Jiménez).

*Catharus mexicanus mexicanus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 22, *part* (southern Mexico to Panama; — Costa Rica: Jiménez, Tucurríqui, Irazú, Miravalles, Bonilla, Turrialba).

*Catharus mexicanus fumosus* RIDGWAY, Birds N. and Mid. Amer., IV, 1907, 24 (highlands of Costa Rica, precise locality unknown).

Bangs Collection: Carrillo, La Vijagua, Cerro de Santa Maria (Underwood).

Fleming Collection: Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Volcan de Irazú, Volcan de Turrialba, 2,000 feet, Guácimo, Carrillo (Carriker). Eight specimens.

The name *Catharus fumosus* Ridgway was applied to a slightly immature specimen of an otherwise normal bird of the Costa Rican type of *C. mexicanus*. The remainder of the Costa Rican specimens examined Mr. Ridgway placed under true *C. mexicanus*, leaving a supposed subspecies with a range in the middle of the range of the species from which it was separated. However, all Costa Rican birds are very different from true *C. mexicanus* of Vera Cruz, which fact was overlooked by Mr. Ridgway, and they must therefore be known under the name *Catharus mexicanus fumosus* (Ridgway), which name, although not really meant for the birds in question, must nevertheless be used for them.

This thrush is found on the Caribbean slope of the northern half of Costa Rica, from 1,000 to about 5,000 feet, and on the Pacific slope in the extreme northwestern portion of the country, probably from the Volcan de Miravalles northward. It is found only in heavy, humid forest, and as a rule seeks out the darkest parts. I found it abundant and breeding on the lower foothills to the north of the Volcan de Turrialba at an altitude of about 2,000 feet. Two nests were taken on April 20, 1903, containing two eggs each, both with incubation just begun. The nest is made almost entirely of green moss, with a few blades of grass in the bottom, and with the inner portion strengthened with rootlets. The lining is composed entirely of skeletonized leaves, which gives a beautiful effect in contrast with the green moss. Both were placed in small palms in the dark forest, about five feet from the ground. The eggs are pinkish-white, very thickly and finely speckled with bright reddish-brown over the entire surface, but heavier at the larger end. Average measurements: 24×18 mm.

## Family SYLVIIDÆ.

529. *Polioptila superciliaris* Lawrence.

*Polioptila superciliaris* LAWRENCE, Ann. Lyc. N. Y., VII, 1861, 304, 322 (Lion Hill, Panama R. R.; coll. G. N. Lawrence); IX, 1868, 92 (Angostura, Atiro, Guaitíl [J. Carmiol]).

*Polioptila bilineata* (not *Culicivora bilineata* Bonaparte ?) SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 52, *part* (Costa Rican references). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 387 (La Palma de Nicoya). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 387 (critical). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 452 (Turrialba [Arcé], Puntarenas [O. Salvin]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Angostura). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 3 (Boruca, Térraba, and Buenos Aires). — UNDERWOOD, Ibis, 1896, 432 (Miravalles; footnote by O. Salvin).

*Polioptila superciliaris superciliaris* RIDGWAY, Birds N. and Mid. Amer., III, 1904 (Isthmus of Panama to Guatemala). — BANGS, Auk, XXIV, 1907, 304 (Boruca, El Pózo, Paso Real, and Barránca de Térraba [Underwood].)

*Polioptila superciliaris magna* RIDGWAY, Proc. Biol. Soc. Wash., XVI, 1903, 110 (Cartago, Costa Rica; coll. U. S. Nat. Mus.); Birds N. and Mid. Amer., III, 1904, 728 (highlands of Costa Rica: Cartago).

U. S. Nat. Museum: Pígres (Ridgway), Bonilla (Ridgway, Zeledón, and Alfaro), Pózo Azul de Pirrís (Zeledón).

Bangs Collection: Bolson, Tenorio, Coralillo, El General, and Buenos Aires de Térraba, Cerro de Santa Maria (Underwood).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Pózo Azúl de Pirrís, Bagáces, Miravalles, El Pózo de Térraba, Boruca, Buenos Aires, Guácimo, Guápiles, El Hogar (Carriker). Seventeen skins.

Nearly all skins of *P. s. superciliaris* which I have seen from the Caribbean slope of Costa Rica are slightly different from those of the Pacific, in that they are slightly larger and darker. These differences, are, however, not constant enough to admit of the separation of the eastern bird as a subspecies. I have examined the type of Mr. Ridgway's *P. superciliaris magna*, and I believe it to be only an unusually large and dark-colored bird of *P. s. superciliaris*. Its measurements are scarcely greater than those of some specimens of typical *superciliaris* from the Pacific coast. It may be that with additional material from the eastern slope, those birds will prove to be separable from the form found on the western coast, in which case they will bear the name *magna*, which Mr. Ridgway gave to the bird from Cartago, and the range of which he gives as the highlands.

At present we may say that the bird ranges over the whole of Costa

Rica from near sea-level up to 4,500 or 5,000 feet, being most abundant on the Pacific slope between sea-level and 2,000 feet, and quite rare on the Caribbean slope and in the highlands. They do not frequent the heavy forests, but scattering trees in pastures, shrubbery along river banks, and the borders of the woodland, keeping near to the ground as a rule. They are very tame and unsuspecting, allowing a person to approach them very closely without taking alarm.

530. *Polioptila bairdi* Ridgway.

*Polioptila albiloris* (not of Sclater and Salvin), ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Liberia and "Cartago" (?)). — HELLMAYR, Tierreich, 18 Lief., 1903, 28, *part* (Miravalles, Costa Rica). — UNDERWOOD, Ibis, 1896, 432 (Miravalles; footnote, O. Salvin).

*Polioptila bairdi* RIDGWAY, Proc. Biol. Soc. Wash., XVI, 1903, 110 (San Juan del Sur, Nicaragua; coll. U. S. Nat. Mus.); Birds N. and Mid. Amer., III, 1904, 726 (western Nicaragua and Costa Rica: Liberia, Volcan de Miravalles, Cartago?).

Bangs Collection: Bagáces and Miravalles (Underwood). Three skins.

C. H. Lankester Collection: Bagáces.

Carnegie Museum: Bebedéro and Ciruélas (Carriker). Four skins.

This is a very rare and local form in Costa Rica, occurring only in Guanacaste, apparently from the Tempisque Valley northward into Nicaragua, along the Pacific lowlands and foot-hills. This bird is easily distinguished by the absence of the white streak over the eye. Its habits are the same as those of the closely allied form *P. superciliaris*.

Family CINCLIDÆ.

531. *Cinclus ardesiacus* Salvin.

*Cinclus ardesiacus* SALVIN, Ibis, 1867, 121, pl. 2 (Cordillera de Tóle, Veragua [Arcé]; coll. Salvin and Godman). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (Dota Mts. [Zeledón]). — FRANTZIUS, Jour. für Orn., 1869, 290 (Dota Mts.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 45 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 319 (Costa Rica and Veragua). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Santa Maria de Dota). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 681 (mountains of Chiriquí, Veragua, and Costa Rica: Dota Mountains); Auk, XXIV, 1907, 105 (Costa Rica; crit.).

*Cinclus mexicanus* CHERRIE, Auk, VIII, 1891, 395 (mountains of Costa Rica, common). — RIDGWAY, Auk, XXIV, 1907, 105 (not found in Costa Rica; crit.).

U. S. Nat. Museum: Irazú and Laguna de Cartago (Alfaro), San Lucas and La Lagunaria de Dota (Basulto).

Bangs Collection: Carrillo (Underwood).

Carnegie Museum: Ujurrás de Térraba (Carriker). One female.

The Costa Rican Dipper is found over the whole of the higher portions of the country, but in small numbers. The lowest point at which I have observed it was in the gorge of the Rio Súcio above Carrillo at an elevation of about 2,000 feet. The bird seems partial to deep gloomy gorges, where it frequents the rocks in the cold mountain torrents.

I found one pair on a branch of the Rio Ceibo, high up in the mountains above Ujurrás de Térraba, where the stream came tumbling and foaming down through a deep gorge. Their discovery was caused by first finding the nest as I was climbing up a precipitous wall of rock beside a waterfall. It was a rather flat, cup-shaped structure, built almost entirely of moss and placed on a narrow shelf of rock on the brink of the falls.

It contained but one partially incubated egg, which was blown, but later misplaced, and lost, so that I cannot give its measurements. In color it was plain dull white, of the usual shape and size of the Water Ouzel of the United States.

#### Family TROGLODYTIDÆ.

##### 532. *Leucolepis lawrencii* (Sclater).

*Cyphorhinus lawrencii* LAWRENCE, Ann. Lyc. N. Y., VIII, 1863, 5 (Lion Hill Station, Panama R.R.; coll. G. N. Lawrence; from Sclater MS.). — SCLATER, and SALVIN, Exotic Orn., pt. III, 1867, 41, pl. 21 (Panama). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 75 (Angostura and Valsa, Costa Rica [Carmioli]). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 293 (no Costa Rican record).

*Cyphorhinus lawrenczi* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (Angostura [Carmioli]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Pacuare and Matina).

*Leucolepis lawrencii* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 673 (southeastern Honduras to Isthmus of Panama; — Costa Rica: Talamanca, Angostura, Valsa, Pacuare, Matina).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón), Reventazón (Carranza), San Carlos (Underwood).

Bangs Collection: La Vijagua and Carrillo (Underwood).

C. H. Lankester Collection: La Florida.

Fleming Collection: Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford), Cuábre, Rio Sicsola, Carrillo, El Hogar (Carriker). Ten skins.

This peculiar wren is confined to the Caribbean lowlands, being found

from sea-level up to about 1,500 feet, over the whole length of the country. It is exclusively an inhabitant of the dense, dark forest, where it keeps close to the ground. The birds are almost always seen in small flocks in company with one or more species of small ant-thrushes (*Ramphocænus semitorquatus*, *Myrmeciza exsul*, etc.), and when disturbed set up a continuous chattering of a low guttural nature, all the while hopping about excitedly among the low bushes and the roots of the trees. It has a song which is very fine, almost rivalling that of *Henicorhina prosthaleuca* in its clearness and sweetness. It is not an abundant bird, and may not be met with more than once in a week's collecting, seeming to travel about in flocks (when not breeding) from one place to another.

533. ***Microcerculus lusciniæ* Salvin.**

*Microcerculus lusciniæ* SALVIN, P. Z. S., 1866, 69, 71; 1867, 134 (Santa Fé and Santiago de Veragua [Arcé]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 77, pl. 5, fig. 4. — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 298 (Veragua and Panama). — RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 609 (Boruca, Costa Rica; desc. female; crit.). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 6 (Boruca, one specimen). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Pacuare). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 669 (Isthmus of Panama from Panama Railroad to southwestern Costa Rica: Boruca). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 34, *in text* (crit.).

*Microcerculus acentetus* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 56 (Boquete, Chiriquí [Brown]).

*Microcerculus daulias* RIDGWAY, Proc. U. S. Nat. Mus., X, 1888, 508 (Talamanca, Costa Rica [Cooper]; coll. U. S. Nat. Mus.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Costa Rica). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 668 (eastern Costa Rica: Pacuare and Talamanca). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 34, *in text* (critical).

*Microcerculus orpheus* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1889, 539 (Pacuare, Costa Rica [Cooper]; coll. U. S. Nat. Mus.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Costa Rica).

Bangs Collection: El General de Térraba, four ♂'s; La Vijagua, ♂ and ♀; Cerro de Santa Maria, two ♂'s and ♀; Tenorio, two ♀'s (Underwood).  
Carnegie Museum: Ujurrás de Térraba, ♂ and ♀ (Carriker).

Mr. Bangs has given a very careful and intelligent discussion of the Central American species of this genus (Proc. Biol. Soc. Wash., XXII, 1909, 34), and after going over his material with him I can arrive at no other conclusion than his, namely, that there is but one form of *Microcerculus* inhabiting Costa Rica and Panama. As to *M. philomela* of Guatemala, I am not prepared to give an opinion, not having had the opportunity of

examining any material from that country, but it would not surprise me to find that they are the same as Costa Rican and Panaman birds. I can do no better than to quote a portion of Mr. Bangs' article in which he sums up the obvious facts in the matter.

"(1) Difference of size in Central American specimens of *Microcerculus* are not great enough or constant enough to be of diagnostic value.

(2) Specimens in immature plumage from one locality show a wide range of variation in color and markings (possibly due to the age of the individual, it requiring more than one month to acquire the adult plumage).

(3) Specimens in adult plumage, or nearly so, are subject to a slight seasonal variation in color, but apart from this can not be satisfactorily distinguished from such remote places lying in such different faunal areas as northeastern Costa Rica on the one hand and southwestern Costa Rica and Chiriquí on the other."

As additional evidence against the probability of differences between the birds of the Caribbean and Pacific slopes, I may cite the fact that the range of the bird (with respect to altitude) is very broad, covering the whole slope from about 1,500 feet up to at least 7,000 feet, so that it would be a very easy matter in many places in Costa Rica for birds from one side of the divide to pass over to the other. For example, the two birds secured at Ujurrás were taken within six or eight hundred feet of the crest of the continental divide, which is very narrow at that point, dropping down abruptly on the opposite side into the valley of the Cueng, one of the largest tributaries of the Sicsola, which drains the whole of Talamanca.

534. ***Salpinctes guttatus*** Salvin and Godman.

*Salpinctes guttatus* SALVIN and GODMAN, Ibis, 1891, 609 (Volcan de San Miguel, Salvador, 4,000 feet, coll. Salvin and Godman). — UNDERWOOD, Ibis, 1896, 433 (Miravalles, Costa Rica; first record for C. R.). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 653 (Volcan de San Miguel, Salvador; Volcan de Conchagua, Salvador?; Volcan de Miravalles, Costa Rica?).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Volcan de Miravalles (Carriker and Lankester).  
Nine specimens.

It has always been suspected by ornithologists in this country that the Rock Wren, occurring in Costa Rica on the Volcan de Miravalles, was different from *S. guttatus* of Salvador, so that to settle the matter once for all, Mr. Bangs and myself sent a series of skins from Miravalles to the British Museum, where they were carefully compared with the types of

*S. guttatus*. After comparison we were positively informed that there is no difference between the birds from the two localities.

Thus far this species has been taken in Costa Rica only on the Volcan de Miravalles, at an altitude of about 2,000 feet, where it was first discovered by Mr. C. F. Underwood in 1895. It resorts exclusively to the lichen-covered stone-heaps found scattered in abundance over the pastures on the volcano. In habits it is very similar to the common Rock Wren of the Western United States (*Salpinctes obsoletus*) and it very probably builds its nest in the crevices between the rocks in the same manner as the North American bird.

535. ***Thryophilus zeledoni*** Ridgway.

*Thryophilus zeledoni* RIDGWAY, Proc. U. S. Nat. Mus., I, 1878, 252 (Talamanca, Costa Rica [Zeledón]; coll. U. S. Nat. Mus.; ex Lawrence MS.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 84 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 210. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Pacuare). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 520 (Costa Rica; crit.). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 642 (Atlantic lowlands of Nicaragua and Costa Rica: Pacuare and Talamanca).

Bangs Collection: One skin, no locality (Underwood?).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Cuáb্রে and Rio Sicsola de Talamanca, Guápiles (Carriker). Five specimens.

This is one of the rarest of the genus in Costa Rica and has a rather local distribution, being found only in the Caribbean lowlands, from sea-level up to about 1,000 feet. I first found the bird along the Sicsola River, where they frequented the wild-cane brakes and a high tangled grass found only along the river banks, known as "Gamilote." I never saw it in the forest. I found it also in the vicinity of Guápiles, where two birds were secured in the brush growing alongside the railroad-track. Its habits are very similar to those of the following species, to which it is evidently closely related.

536. ***Thryophilus modestus modestus*** (Cabanis).

Native name "Chinchirigüí."

*Thryothorus modestus* CABANIS, Jour. für Orn., 1860, 409 (San José and Quebrada Honda, C. R. [Hoffmann and Ellendorf]; coll. Berlin Mus.). — BAIRD, Rev. Amer. Birds, 1864, 122 (diagnosis).

*Thryophilus modestus* BAIRD, Rev. Amer. Birds, 1864, 131, *part* (San José). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (San José and Guaitíl [J. Carmiol],

San Mateo [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 291 (plains of San José to 5000 feet). — BOUCARD, P. Z. S., 1878, 51 (San José, Cartago, and San Mateo). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 83, *part* (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 209, *part* (San José [Boucard]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Alajuela, San José, Navarro de Cartago, Cervantes de Cartago, Pózo Azul de Pirís). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (Irazú [Nutting], 499 (San José [Nutting])). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 520 (Costa Rica; crit.); Auk, VIII, 1891, 275 (San José; habits; nesting); Expl. Zool. en C. R., 1891-2, 1893, 10 (Palmár, Lagarto, Boruca, Terraba, Buenos Aires).

*Thryophilus modestus modestus* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 639 (Nicaragua and Costa Rica: San José, San Mateo, Alajuela, Volcan de Irazú, Guaitíl, Palmar, Lagarto, Boruca, Terraba, Navarro de Cartago, Cervantes de Cartago, Pózo Azul de Pirís, and Buenos Aires). — BANGS, Auk, XXIV, 1907, 305 (Boruca, Paso Real, and El Pózo de Terraba [Underwood]; critical).

U. S. Nat. Museum: San José (Cherrie) (Alfaro) (Ridgway), Pózo Azul de Pirís (Zeledón), Alajuela (Alfaro).

Bangs Collection: Rancho Redondo, Coralillo, El General, Buenos Aires (Underwood).

Carnegie Museum: San José, Pózo Azul de Pirís, La Hondura, Esparta, Buenos Aires (Carriker). Twelve skins.

This is the common *Thryophilus* of the highlands and Pacific slope, being found on the upper Caribbean slope from 3,000 feet upwards, over the whole of the plateau region, up to about 7,000 feet, and over the whole of the Pacific slope to sea-level. I was surprised to find this species very abundant in the vicinity of Buenos Aires, inhabiting low shrubbery, especially around the borders of the "sabanas." It is not a woodland bird, but wherever found is always in thickets and clumps of low scrubby trees and along the roadsides. They are noisy birds, chattering and scolding a great deal, but well out of sight. The song is loud, but not very musical. I have not seen the eggs. Mr. Cherrie gives some interesting notes on the habits of the bird (Auk, 1891, 275).

The birds from the Terraba Valley are somewhat intermediate between *T. modestus modestus* and *T. modestus elutus* Bangs, of Chiriquí and Panama, but are nearer to true *modestus* (cf. Bangs, Auk, XXIV, 1907, 305).

### 537. *Thryophilus rufalbus castanonotus* (Ridgway).

*Thryothorus rufalbus* CABANIS, Jour. für Orn., 1860, 408 (Costa Rica [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 291 (San José).

*Thryophilus rufalbus*, var. *rufalbus* BAIRD, Rev. Amer. Birds, 1864, 128, *part* (Costa Rica).



*Thryophilus rufalbus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (San Mateo [Cooper]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 82, *part* (Volcan de Irazú [Rogers], Bebedéro [Arcé]). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 212, *part* (Costa Rica [Van Patten]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 390 (La Palma de Nicoya; habits, song).

*Thryothorus rufalbus castanonotus* RIDGWAY, Proc. U. S. Nat. Mus., X, 1887, 508 (Angostura, Costa Rica [Zeledón]; type in coll. U. S. Nat. Mus.).

*Thryophilus rufalbus castanonotus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Monte Redondo, Alajuela, and Pózo Azul de Pirris). — RIDGWAY, Proc. Bost. Soc. Nat. Hist. XXIII, 1888, 386, *in text* (type from "Angostura," Costa Rica). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 519 (Costa Rica; crit.); Expl. Zool. en C. R., 1891-2, 1893, 10 (Lagarto, four specimens), — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 633 (Nicaragua to northern Colombia; — Costa Rica: Angostura, San José, San Mateo, Monte Redondo, Alajuela, Bebedéro, Volcan de Irazú, Lagarto, Pózo Azul de Pirris, Guaitil, La Palma de Nicoya). — BANGS, Auk, XXIV, 1907, 305 (Boruca, Paso Real, and Lagarto de Térraba [Underwood]).

U. S. Nat. Museum: Monte Redondo and Alajuela (Alfaro), Pózo Azul de Pirris, and Sarchí (Underwood).

Acad. Nat. Sci. Philadelphia: Miravalles and Bebedéro (Underwood).

Bangs Collection: Tenorio, Cerro de Santa Maria, Bolson, Miravalles, and Pózo Azul de Pirris (Underwood).

Carnegie Museum: Pózo Azul de Pirris, Esparta, Miravalles, Bebedéro (Carriker). Nine skins.

The range of the present species covers the whole of the Pacific slope and lowlands from sea-level up to at least 4,500 feet. A single record (the type for the subspecies) comes from Angostura, on the Reventazón River, on the Caribbean slope at about 1,800 feet. This bird was taken by Zeledón and the locality is without a doubt correct. I believe it is out of the regular range of the bird, however, which is confined to the highlands and Pacific slope. The most of the birds which I met with were found in the forest near a small creek, where the trees were rather open, letting in considerable light. Two nests were taken, one at Pózo Azul de Pirris, May 11, 1902, containing four fresh eggs; the other at Esparta, June 6, 1907, with four fresh eggs.

The nest is almost an exact counterpart of that of *T. castaneus costaricensis*, being made of grass and rootlets, elbow-shaped, and placed in the fork of a small tree ten feet above the ground. The eggs are pale robin's-egg blue, unmarked. Measurements: 22 to 23 × 15 to 16 mm.

### 538. *Thryophilus pleurostictus ravus* Ridgway.

*Thryothorus pleurostictus* (not of Sclater, 1860) BAIRD, Rev. Amer. Birds, 1864, 123, *part* (Gulf of Nicoya).

*Thryophilus pleurostictus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (Gulf of Nicoya, "coll. O. Salvin"). — FRANTZIUS, Jour. für Orn., 1869, 291 (Costa Rica). — BOUCARD, P. Z. S., 1878, 51 (Puntarenas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 86 (Tempate and Bebedéro [Arcé]). — UNDERWOOD, Ibis, 1896, 433 (Miravalles).

*Thryophilus pleurostictus rarus* RIDGWAY, Proc. Biol. Soc. Wash., XVI, 1903, 167 (San Juan del Sur, Nicaragua; coll. U. S. Nat. Mus.); Birds N. and Mid. Amer., III, 1904, 631 (western Nicaragua and Costa Rica: Tempate, Bebedéro, Puntarenas, Gulf of Nicoya, and Miravalles). — BANGS, Auk, XXIV, 1907, 305 (Barranca de Puntarenas [Underwood]).

U. S. Nat. Museum: Santo Domingo de San Mateo (Ridgway), Bahía de Salinas (Alfaro).

Acad. Nat. Sci. Philadelphia: Bebedéro and Miravalles (Underwood).

Bangs Collection: Bolson, Bagáces, Tenorio, Coralillo, Miravalles (Underwood).

C. H. Lankester Collection: Bebedéro, Mojica, and Miravalles.

Carnegie Museum: Bebedéro, Miravalles, Bagáces, Esparta (Carriker).

Eleven skins.

This *Thryophilus* comes into Costa Rica from the Pacific lowlands of Nicaragua, penetrating as far south as the Rio Grande de Tárcoles on the mainland, and covers practically the whole of the peninsula of Nicoya from sea-level up to 2,000 feet. It seems to prefer the more open scrubby woodland to the heavy forest, although found in both. Its habits are much the same as *T. castaneus costaricensis*, except that it is a much inferior songster. I found it fairly abundant about Esparta, in a region from which it had hardly been reported before.

### 539. *Thryophilus thoracicus* (Salvin).

*Thryothorus thoracicus* SALVIN, P. Z. S., 1864, 580 (Tucurríqui, Costa Rica [Arcé]; coll. Salvin and Godman).

*Thryophilus thoracicus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 93 (Santa Rosa [J. Carmiol], Tucurríqui [Zeledón]). — BOUCARD, P. Z. S., 1878, 51 (San Carlos). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 86, pl. 6, figs. 1, 2 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 215 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Jiménez and Pacuare). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 520 (Costa Rica; crit.). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 628 (eastern Nicaragua to Isthmus of Panama; — Costa Rica: Rio Frio, Talamanca, Siquirris, Pacuare, Tuís, Jiménez, Turrialba, Tucurríqui, Santa Rosa, San Carlos, Val, Cervántes).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Turrialba (Zeledón), Reventazón (Carranza), Buena Vista (Castro and Fernandez).

Bangs Collection: La Vijagua and Carrillo (Underwood).

C. H. Lankester Collection: Miravalles and El Hogar.

Fleming Collection: Carrillo and "Pózo Azul de Pirrís" (Underwood).

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford),  
Guácimo, Cuábre, Rio Sicsola, Carrillo, El Hogar, Miravalles (Carriker).  
Nineteen skins.

This wren has a wide distribution in Costa Rica, but is not common anywhere. It is found over the whole of the Caribbean lowlands and slope up to about 2,000 feet, and on the Pacific slope north of the Gulf of Nicoya (Miravalles). It is very rare on the Pacific side, there being no other records for Guanacaste besides a bird taken at Miravalles by Mr. Lankester. In Mr. Fleming's collection there is a specimen labelled Pózo Azul (Underwood), but I doubt very much the authenticity of the labelling. Underwood is very careless at times about his labelling, keeping no written record of his collection, so that there is always a question about one of his birds which comes from a doubtful locality, when not substantiated by other records.

It inhabits the dense thickets and vine-covered jungle rather than more open woodland, and as a rule keeps rather higher up in the trees than most of the wrens. It is generally very quiet, does not scold or chatter, and keeps well concealed. Its song is very different from that of the other members of the genus and for a long time I never associated it with this bird, but thought it was the whistling of a trogon (*T. caligatus* or *atricollis tenellus*). It consists of two high-pitched whistling notes and always sounds much farther away than it really is.

A nest was secured at Jiménez, May 9, 1905, containing three eggs, very badly incubated, so much so that but one could be preserved. The nest is a dome-shaped structure, made of weed-fibres, moss, and fine grass, and lined with very fine vegetable fibres and a few feathers. It was placed on a horizontal limb of a small tree on the edge of the forest, the limb containing the nest projecting out into the open, and about eight feet from the ground. The nest measured in inches about 6.5 outside diameter; 5 outside depth; cavity, about 2.5 in diameter. The eggs are white, with a slight bluish tinge, unmarked. The one remaining egg measures:  $19.5 \times 14$  mm.

540. ***Thryophilus semibadius*** (Salvin).

*Thryothorus semibadius* SALVIN, P. Z. S., 1870, 181 (Bugába, Veragua; coll. Salvin and Godman).

*Thryophilus semibadius* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880,

88, pl. 6, fig. 3. — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 216 (Panama). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Pózo Azul de Pirrís). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 520 (Costa Rica; crit.); Expl. Zool. en C. R., 1891-2, 1893, 11 (Palmár, Lagarto, Buenos Aires, Cabagra). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 627 (Veragua and southwestern Costa Rica: Pózo Azul de Pirrís, Pózo Pital, Lagarto, Buenos Aires, Palmár, Cabagra). — BANGS, Auk, XXIV, 1907, 305 (Boruca, Paso Real, El Pózo, and Lagarto de Térraba [Underwood]).

U. S. Nat. Museum: Pózo Azul de Pirrís (Underwood), Pózo Pital (Cherrie).

Bangs Collection: Pózo Azul de Pirrís and El General de Térraba (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Térraba, Boruca, and Buenos Aires (Carriker). Ten skins.

This beautiful wren enters Costa Rica from the southward and is found only on the Pacific lowlands as far up as the valley of the Rio Grande de Pirrís, from sea-level up to not more than about 1,500 feet. It is commonest at lower altitudes, especially along the rivers and small streams, where the birds are fond of hiding away in the low, vine-covered jungle. I found them in the heavy forest also, where undergrowth abounded. Unlike the following species, they are very shy, and are very difficult to shoot; yet, in spite of their timidity, keep up a continuous scolding when anyone is near them. I found one of their nests at Pózo Azul de Pirrís, not yet finished, and unfortunately shot the female as she left it, supposing that it contained eggs. It was very similar to the nest of *Thryophilus thoracicus* (see description under that species).

541. ***Thryophilus castaneus costaricensis*** (Sharpe).

*Thryophilus castaneus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 93 (Pacuare [J. Carmiol], Angostura [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 291 (Costa Rica). — BOUCARD, P. Z. S., 1878, 51 (San Carlos). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 88, *part* (Tucurríqui [Arcél]).

*Thryophilus costaricensis* SHARPE, Cat. Birds Brit. Mus., VI, 1881, 217 (Costa Rica [Boucard]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Jiménez and Rio Súcio). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 519 (Costa Rica; critical). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893 (Rio Frio).

*Thryophilus castaneus costaricensis* HELLMAYR, Verh. K. K. Zool. Bot. Gesellsch. Wien, 1901, 767, text. — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 625 (Nicaragua and eastern Costa Rica: Pacuare, Jiménez, Limon, Rio Frio, Talamanca, "San José," Angostura, Tucurríqui, Rio Súcio).

U. S. Nat. Museum: Bonilla and Jiménez (Alfaro), Jiménez (Cherrie) (Verrill), Reventazón (Carranza), Guayábo and Turrialba (Ridgway).

Bangs Collection: Carrillo and La Vijagua (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), Carrillo, El Hogar, Guácimo, Cuábre (Carriker). Thirteen skins.

This handsome species is found only in the Caribbean lowlands and lower slopes of the Cordillera, from near sea-level up to not more than 2,000 feet, but not at all commonly above 1,200 feet. It also inhabits the heavy forest, but is not so shy as *Henicorhina* and does not creep around amongst the fallen trees and rubbish so much as that bird. It is also a fine songster, possessing a strong clear song of sweet liquid notes, but not of such great range as *Henicorhina protheleuca*.

They are almost always seen in pairs and are fairly abundant in some sections. I found many nests of this bird at Guápiles, Jiménez, El Hogar, and on the Rio Sicsola, all being built of weed-stems, grass, rootlets, and skeletonized leaves, and always entirely lined with soft skeletonized leaves. It is an elbow-shaped structure, usually hung in an upright crotch of some small tree or shrub from five to fifteen feet above the ground, and is usually about ten inches long and with a diameter of three to five inches at the larger end. Two nests taken with fresh eggs were secured at Jiménez, May 9 and 11, and each contained three eggs, which seems to be the full complement for this species. The eggs are pure white, sparingly speckled over the whole surface (more thickly about the larger end) with cinnamon-brown. Measurements of one set:  $23 \times 16$ ,  $25 \times 16.5$  and  $24 \times 17$  mm.

542. *Henicorhina leucophrys collina* (Bangs).

*Heterorhina leucophrys* BAIRD, Rev. Amer. Birds, 1864, 118, *part* (description; San José, Costa Rica).

*Cyphorhinus leucophrys* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (San José, [Frantzius]).

*Henicorhina leucophrys* SALVIN, P. Z. S., 1870, 181 (Veragua). — BOUCARD, P. Z. S., 1878, 51 (Navarro). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1878, 80, *part* (Irazú [Rogers]). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 288, *part* (Costa Rican specimens). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (Irazú [Nutting]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Santa Ana, La Palma de San José, Naránjo de Cartago). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 518 (Volcan de Póas; critical). — UNDERWOOD, Ibis, 1896, 433 (Miravalles, rare).

*Henicorhina collina* BANGS, Proc. N. Eng. Zool. Club, III, 1902, 55 (Boquete, Chiriquí, 6000 ft.).

*Henicorhina leucophrys collina* HELLMAYR, Jour. für Orn., 1903, 531. — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 613 (Chiriquí and Veragua to Costa Rica: San José, Santa Ana, La Palma de San José, Navarro de Cartago, Volcan de Irazú, Volcan de Póas, Volcan de Miravalles, El Achióte de Póas).

U. S. Nat. Museum: Volcan de Póas (Ridgway), Jiménez (Alfaro), Burgos de Irazú (Castro), El Roble de Irazú (Cherrie); Azahar, Irazú, Estrella and El Achióte (de Póas).

Bangs Collection: Irazú and "Carrillo."

Carnegie Museum: Volcan de Irazú, La Hondura, Ujurrás de Térraba, Volcan de Turrialba, La Estrella de Cartago (Carriker). Eleven skins.

This species is restricted to the higher portions of the plateau region and the high mountain peaks up to timber-line, and is rarely taken below 5,000 feet.

Like the following form it is found only in the heavy forest, keeping on or near the ground and hiding itself with the greatest dexterity in places where no apparent place of concealment exists. It is also a beautiful songster, but not quite equal to its relative of the lowlands. I secured a nest of this species on the Volcan de Irazú, April 17, 1902, containing two badly incubated eggs. The birds make many false nests, in the same manner as the Marsh Wren, placing them in places where they are easily seen, while the real nest is tucked away in some cunningly concealed nook, almost impossible to find. The nest I secured is an elbow-shaped structure about eight inches in length by three and a half in diameter, with the opening underneath at one end, much in the same manner as the nests of *Myiozetetes* and *Pitangus*. It is constructed entirely of black and brown rootlets, with a top covering of green moss, and placed on a spray of bamboo hanging over the side of a deep ravine. The eggs are pure white, unmarked, and measure:  $21.5 \times 15$  and  $22 \times 15$  mm. Another nest was taken on April 19, also containing two eggs, with incubation just begun, which was built in precisely the same manner and placed in the same kind of a situation.

543. ***Henicorhina prosthaleuca prosthaleuca*** (Sclater).

*Scytalopus prosthaleucus* SCLATER, P. Z. S., 1856, 290 (Cordova, Mexico).

*Henicorhina prosthaleuca* SHARPE, Cat. Birds Brit. Mus., VI, 1881, 286, *part* (San Carlos, Costa Rica [Boucard]). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 519 (crit.).

*Cyphorinus leucostictus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (Angostura and Turrialba [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869 (Costa Rica).

*Henicorhina leucosticta* BOUCARD, P. Z. S., 1878, 51 (San Carlos and Orósi). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 79, *part* (Costa Rican references). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Jiménez and Angostura).

*Henicorhina prosthaleuca pittieri* RIDGWAY, Birds N. and Mid. Amer., III, 1904, *part* (Panama and Costa Rica: Angostura, Turrialba, Tucurríqui, Jiménez, Siquirris, San Carlos, Orósi, Talamanca).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway), San Carlos (Alfaro), Juan Viñas (Underwood), Revantazón (Carranza), Jiménez (Verrill).

Bangs Collection: Tenorio, Cerro de Santa Maria, Juan Viñas, La Vijagua, Carrillo (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), Juan Viñas, Carrillo, Rio Sicsola, Cuábres, Miravalles, El Hogar (Carriker). Thirty-seven skins.

After carefully comparing a large series of Costa Rican birds of this species with skins from Honduras and Mexico, I find that all birds from northern and eastern Costa Rica are inseparable from true *prosthaleuca*, and that the southern race, *H. p. pittieri* (Cherrie), is restricted to the extreme southwestern portion of the country, practically the Térraba Valley, whence came the type of the subspecies.

I have therefore placed all Costa Rican references under *H. p. prosthaleuca*, except those referring to birds from the southwestern portion of the country.

The range of this form in Costa Rica covers the whole of the Caribbean lowlands and the slopes up to about 3,000 feet, also the Pacific slope from Nicaragua south to the Gulf of Nicoya, at least. It is an inhabitant of the heavy forest, keeping in the thick and tangled underbrush near the ground, and is very shy. The species is one of the most beautiful songsters of the country, some individuals developing a song which is truly remarkable for its sweetness and rhythm, and the liquid purity and diversity of its notes. Although the bird has a wide range it does not seem to be very common in any locality, that is, there are not many individuals in any one place. They are almost invariably seen in pairs, and when disturbed, show remarkable skill in skulking off without being seen by the observer.

544. *Henicorhina prosthaleuca pittieri* (Cherrie).

*Henicorhina pittieri* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 8 (Boruca, Dec. 16, 1891; coll. Mus. Nac. de Costa Rica; also Térraba [Cherrie]).

*Henicorhina leucosticta* SALVIN and GODMAN, Biol. Centr.-Am., I, 1879, 79, *part*.

*Henicorhina prosthaleuca* SHARPE, Cat. Birds Brit. Mus., VI, 1881, 286, *part*.

*Henicorhina prosthaleuca pittieri* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 612, *part* (Costa Rica to Isthmus of Panama; — Costa Rica: Térraba and Boruca).—BANGS, Auk, XXIV, 1907, 305 (Boruca, seventeen specimens [Underwood]).

U. S. Nat. Museum: La Lagunaria de Dota (Basulto).

Bangs Collection: Boruca (Underwood).

Carnegie Museum: Boruca and Ujurrás de Térraba (Carriker). Four specimens.

In Costa Rica this race of *H. prosthaleuca* is confined to the extreme southwestern portion of the country, probably getting no farther north than the Dota Mountains. Its habits and altitudinal range are the same as those of the preceding species, although I took a specimen (and saw others) at about 7,000 feet elevation in the mountains above Ujurrás, in company with *H. leucophrys collina*, which is rather unusual. One of these birds had developed a very beautiful song and sang several times each day close by our camp, and whenever he started we all stopped work to listen.

545. ***Thryorchilus browni ridgwayi*** (Bangs).

*Thryorchilus ridgwayi* BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 108 (Volcan de Irazú, (♂?), C. F. Underwood, Mar. 4, 1899; coll. E. A. and O. Bangs; Irazú, May, 1905, one specimen [Alfaro]); Proc. N. Eng. Zool. Club, IV, 1908, 30 (Volcan de Irazú, four specimens [Underwood]).

U. S. Nat. Museum: Volcan de Turrialba, 9,680 feet (Ridgway and Zeledón), San Juan de Irazú (Alfaro).

Bangs Collection: Volcan de Irazú, four specimens (Underwood).

Carnegie Museum: Volcan de Irazú, one specimen; Volcan de Turrialba, eight specimens (Carriker).

This recently discovered and very local race of *Thryorchilus browni* has been found thus far only on the Volcanoes Irazú and Turrialba. The first specimen was taken on Irazú by Underwood in 1899, but remained unknown in his collection until received by Mr. Bangs in 1905. I secured a single specimen from Irazú in 1902, which also remained undetected in the collection of the Carnegie Museum. In 1907, while collecting on the Volcan de Turrialba, I found the bird very abundant in the scrub just at timber-line and among the low bushes above timber-line, nearly up to the summit of the crater.

It is very tame, but keeps hidden away among the bushes and brush-heaps so that it is hard to shoot. It is also found commonly among the bamboos just below timber-line, like *T. browni* on the Volcan de Chiriquí. Under the description of the species Mr. Bangs states that there is no cane (bamboo) on Irazú, but he was evidently wrongly informed on this point, because on the northern and eastern sides of the mountain it is very abun-



dant, right up to timber-line, so thick in many places as to be almost impenetrable.

Upon a careful comparison of a series of birds from Irazú with a series of *T. browni* from the Volcan de Chiriquí, I am forced to the conclusion that the two birds are not specifically distinct, the differences between them being entirely too small to be of specific value.

546. **Thryorchilus basultoi** Ridgway.

*Thryorchilus basultoi* RIDGWAY, Proc. Biol. Soc. Wash., XXI, 1908, 191 (Las Vueltas, Cordillera de Dota, Costa Rica; adult female; May 21, 1908; Francisco Basulto; coll. U. S. Nat. Mus.).

"Differing from *T. browni* and *T. browni ridgwayi* in having the pileum and hindneck and auricular area dark sepia or nearly clove-brown, strongly contrasted with the mummy-brown of back, instead of concolor with the back; superciliary stripe much broader, pure white, white under parts much purer, and white markings much more conspicuous; wing and tail decidedly stronger, but bill much shorter and relatively stouter. Length (skin), 95 mm.; wing, 52; tail, 32.5; exposed culmen, 11.5; tarsus, 22.5; middle toe, 15."

This bird was taken near the summit of the highest portion of the Dota Mountains, evidently having the same habits as the preceding species. It is known only from the single type specimen.

547. **Troglodytes ochraceus** Ridgway.

*Troglodytes solstitialis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 102, *part* (Costa Rica). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 260, *part* (Costa Rica).

*Troglodytes ochraceus* RIDGWAY, Proc. U. S. Nat. Mus., IV, 1882, 334 (Vol. de Irazú, Costa Rica [Cooper]; coll. U. S. Nat. Mus.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (Costa Rica). — OBERHOLSER, Proc. U. S. Nat. Mus., XXVII, 1904, 200 (Vol. de Irazú; crit.). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 590 (high mountains of Chiriquí and Costa Rica: Volcan de Irazú). — BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 28 (Volcan de Irazú [Underwood]).

U. S. Nat. Museum: Coliblanco (Ridgway), Volcan de Irazú (Cherrie).  
Bangs Collection: Azahar de Cartago, Volcan de Irazú, and Cariblanco de Sarapiquí (Underwood).

C. H. Lankester Collection: Volcan de Irazú.

Carnegie Museum: Ujurrás de Térraba (Carriker). One skin.

This seems to be a very rare species over its whole range, and but few specimens have been taken, Mr. Bangs probably having more than are

contained in any other collection (about ten skins from Costa Rica and Chiriquí). Most of the birds taken have been collected at high altitudes, in the heavy forests found in those regions. Mr. Bangs has one specimen from Cariblanco de Sarapiquí (2,000 feet), and one was taken at Coliblanco by Mr. Ridgway (5,000 feet). All other skins known from Costa Rica are from much higher altitudes (7,000 to 8,000 feet). The single specimen which I secured at Ujurrás de Térraba was taken in the humid moss-covered forest at about 7,000 feet, right on the top of a cold wind-swept ridge at the summit of the range. Another was shot in the same place but fell down the side of a ravine and could not be found among the mass of vegetation.

548. ***Troglodytes musculus intermedius*** (Cabanis).

*Troglodytes intermedius* CABANIS, Jour. für Orn., 1860, 407 (San José and Quebrada Honda [Hoffmann and Frantzius]; coll. Berlin Mus.). — BAIRD, Rev. Amer. Birds, 1864, 142 (San José). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 93 (San José and Barránca [J. Carmiol]). — BOUCARD, P. Z. S., 1878, 51 (San José, Cartago, and Juan Viñas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 100, *part* (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 252 (Irazú district [Rogers], Tucurríqui [Arcé], Barránca [Carmiol]). — CHERRIE, Auk, VIII, 1891, 275 (San José; notes on habits and nesting). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (San José, Santa Maria de Dota, Monte Redondo).

*Troglodytes inquietus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 93 (Costa Rica).

*Troglodytes musculus intermedius* OBERHOLSER, Proc. U. S. Nat. Mus., XXVII, 1904, 205 (San José, Costa Rica; critical). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 576 (southern Honduras to Costa Rica: San José, Santa Maria de Dota, Barránca, Naránjo, Cartago, Birrís, Tucurríqui).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla and Alajúela (Alfaro), Juan Viñas (Underwood), Reventazón (Carranza), Monte Redondo and Birrís (Zeledón), El Copey and Santa Maria de Dota (Basulto).

Bangs Collection: Escazú, Pózo Azul de Pirrís, Cerro de Santa Maria, Irazú (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí, Cachí, and Juan Viñas.

Carnegie Museum: Volcan de Irazú, Juan Viñas, Miravalles (Carriker). Five skins.

The Costa Rican House Wren is a common bird throughout the whole of the highlands, wherever cultivated lands are found, and extends down into the edge of the lowlands of both the Atlantic and Pacific in small

numbers. It is a rare bird below 2,000 feet, and extends in abundance up to at least 7,000 feet. It is very similar to the common House Wren of North America (*Troglodytes aedon*) in its habits and song, as well as in the manner of building its nest and the color of the eggs, although the clutches seem to be smaller.

I noted two nests of the species, one at Guápiles, July 16, containing three fresh eggs (probably an incomplete set), which was placed in an old woodpecker's hole twelve feet from the ground, with the usual style of nest; the other was taken at Cairo, June 5, and contained four fresh eggs. This nest was placed in a small hollow stub, open at the top, with a cavity two feet deep. The nest was lined with horse-hair and feathers.

549. ***Troglodytes musculus inquietus*** (Baird).

*Troglodytes inquietus* BAIRD, Rev. Amer. Birds, 1864, 143 (Panama Railroad; coll. U. S. Nat. Mus.; from "Lawrence MS.").

*Troglodytes musculus inquietus* OBERHOLSER, Proc. U. S. Nat. Mus., XXVII, 1904, 205 (critical). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 575 (Isthmus of Panama to southwestern Costa Rica ?). — BANGS, Auk, XXIV, 1907, 304 (Boruca, two ♂'s [Underwood]).

\* *Troglodytes furvus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 101, part (Panama).

*Troglodytes striatulus* SHARPE, Cat. Birds Brit. Mus., VI, 1881, 254, part (Panama).

In Mr. Bangs' collection are two specimens of this form from Boruca, agreeing exactly with Panaman skins, so that there can be no question about including the species in the list of the birds of Costa Rica. Like several other forms, it comes up from Chiriquí, penetrating only into the extreme southwestern portion of the country, probably not beyond the Térraba Valley. Lawrence has recorded the species from Costa Rica upon the authority of Salvin and Godman, as collected by Arcé. I have not included this record because I do not believe it to be authentic, since Arcé did no collecting south of the Gulf of Nicoya in Costa Rica and I am quite sure that the species in question does not get that far north. I have seen a specimen from Pózo Azul de Pirrís, a point much farther south than Arcé ever reached, which is typical *T. m. intermedius*, and it is unlikely that the two races overlap. The bird is evidently rare so far north, for but two specimens were secured by Underwood, while I saw none at all in that region, neither of this form nor of the northern *T. m. intermedius*.

550. ***Pheugopedius hyperythrus*** (Salvin and Godman).

*Thryothorus hyperythrus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 91 (Paraiso Station, Panama Railroad; coll. Salvin and Godman). —

RIDGWAY, Proc. U. S. Nat. Mus., IV, 1881, 334 (Carrillos de Alajuéla, Costa Rica [Cooper]; crit.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (La Palma de Puntarenas). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 521 (Pacific side of Costa Rica; critical); Expl. Zool. en C. R., 1890-1, 1893, 12 (Boruca, Térraba, Buenos Aires).

*Thryothorus rutilus hyperythrus* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 390 (La Palma de Nicoya).

*Pheugopedius hyperythrus* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 533 (Isthmus of Panama to western Costa Rica: La Palma de Nicoya, Carrillos de Alajuéla, Boruca, Térraba, and Buenos Aires). — BANGS, Auk, XXIV, 1907, 304 (Boruca and Paso Real de Térraba [Underwood]).

Bangs Collection: Tenorio and Buenos Aires (Underwood).

Acad. Nat. Sci. Philadelphia: Bebedéro (Underwood).

Carnegie Museum: Boruca and Buenos Aires (Carriker). Fourteen specimens.

This wren is confined to the Pacific slope and lowlands, and has been taken in widely separated regions, from the extreme southwestern extremity of the country to the Volcan de Tenorio in the north. It has also been taken at two points near sea-level (La Palma de Nicoya and Bebedéro) as well as at a point near Alajuéla (about 3,000 feet). However, it is a rare bird everywhere in Costa Rica outside of the higher portions of the Térraba Valley, where it reaches its greatest abundance in the vicinity of Boruca. It is a bird which inhabits low scrubby woodland or tangled second-growth, and such conditions are certainly to be found in great abundance in the immediate vicinity of Boruca, where it is found all around the very edges of the village.

It is usually to be seen in pairs, sometimes four or five together, and is very tame and easily approached as a rule. It has a rather harsh note and scolds and chatters a great deal, but I have never heard it sing.

#### 551. *Pheugopedius fasciato-ventris melanogaster* (Sharpe).

*Thryothorus fasciato-ventris* SALVIN, P. Z. S., 1870, 180 (Bugába, Veragua).

*Thryothorus fasciati-ventris* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 90, *part* (San Mateo, Costa Rica). — ZELEDÓN, An. Mus. Nac. de Costa Rica, I, 1887, 105 (Pózo Azul de Pirris).

*Pheugopedius fasciati-ventris* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (San Mateo [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 291 (Costa Rica).

*Thryothorus melanogaster* SHARPE, Cat. Birds Brit. Mus., VI, 1881, 230, pl. 14, fig. 2. — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 521 (Pózo Azul de Pirris [Zeledón], San Mateo [Cooper]); Expl. Zool. en C. R., 1890-1, 1893, 11 (Palmár, Lagarto, Buenos Aires). — RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 523 (descr.).

*Thryothorus fasciati-ventris melanogaster* BANGS, Auk, XVIII, 1901, 368 (Divála, Chiriquí).

*Phlegopedius fasciato-ventris melanogaster* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 532 (Veragua and Chiriquí to Costa Rica: Pózo Azul de Pirrís, San Mateo). — BANGS, Auk, XXIV, 1907, 304 (Boruca, El Pózo, and Barranca de Térraba [Underwood]).

U. S. Nat. Museum: Pózo Azul de Pirrís.

Bangs Collection: Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Térraba, Boruca (Carriker). Fourteen skins.

This species is confined to the southwestern Pacific lowlands of Costa Rica, from the Rio Grande de Tárcoles southward, and from sea-level up to not more than 1,500 feet. It is fairly common in the valley of the Rio Grande de Pirrís, and very abundant in the lower portion of the Térraba Valley, only occasional specimens being taken as high as Boruca. Its habitat and habits are about the same as those of the following species.

552. *Phlegopedius atrogularis* (Salvin).

*Thryothorus atrogularis* SALVIN, P. Z. S., 1864, 580 (Tucurríqui, Costa Rica [Arcé]; coll. Salvin and Godman). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Pacuare and Jiménez).

*Thryothorus atrigularis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 91, pl. 6, fig. 4. — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 231 (Tucurríqui).

*Phlegopedius atrogularis* LAWRENCE, Ann. Lyc. N. Y., VIII, 1865, 180 (Greytown, Nicaragua); IX, 1868, 92 (Tucurríqui [Arcé]; coll. Salvin and Godman) — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 530 (Nicaragua and Costa Rica: Tucurríqui, Pacuare, and Jiménez).

U. S. Nat. Museum: Jiménez (Alfaro) (Carranza).

Bangs Collection: La Vijagua (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles (Carriker & Crawford), Rio Sicsola, Guápiles, El Hogar (Carriker). Eleven specimens.

This handsome species is confined to the lower Caribbean slopes and the lowlands proper, being found from sea-level up to about 2,000 feet over the whole length of the country. It is most abundant below 1,000 feet and especially in the Sicsola Valley, where I found it very common in the wild cane along the streams as well as in the tangled masses of jungle found wherever there are few large trees to keep out the sunlight. Underwood took a good series at La Vijagua, in the extreme northern part of the country, so that it must be fairly common there also.

It is a very good songster, although not so good as many other of the Costa Rican wrens. I was unable to find the nest, although the birds were abundant.

553. ***Heleodytes zonatus costaricensis*** (Berlepsch).

*Campylorhynchus zonatus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (Turrialba and Cervántes [J. Carmiol], Tucurríqui [Zeledón]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 68, *part* (Costa Rican localities and references). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 195, *part* (Pacuare [Carmiol]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Jiménez, Turrialba, Cartago, and Naránjo de Cartago).

*Campylorhynchus zonatus costaricensis* BERLEPSCH, Auk, V, 1888, 450 (Costa Rica; coll. Count von Berlepsch).

*Heleodytes zonatus costaricensis* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 512 (highlands of Costa Rica: "Parita," Turrialba, Cervántes, Tucurríqui, Angostura, Cartago, Naránjo de Cartago, Jiménez).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón), Coliblanco (Ridgway), Jiménez (Alfaro) (Verrill) (Carranza), Guayabal (Underwood). Bangs Collection: Carrillo (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí and Guácimo.

Carnegie Museum: Guápiles (Carriker & Crawford), El Hogar (Carriker). Eleven skins.

This *Heleodytes* is confined strictly to the Caribbean watershed, from about the middle of the country northward, and from about 600 feet to 4,000 feet elevation. It seems to be most abundant from about 800 to 1,000 feet in the Santa Clara Valley, where it is found in the trees scattered about in the pastures and cultivated lands, also in the more open parts of the forest and along the edges of the streams.

The birds are usually seen in pairs or small bands and like the following species are very noisy, chattering incessantly as they clamber about among the branches or up and down the trunks of the trees.

Boucard records this species from San Mateo (Pacific slope, 1,800 feet) but I am certain he refers to the succeeding form, *H. c. capistratus*, which is an abundant bird in that vicinity, while I have never heard of *H. zonatus costaricensis* being taken on the western slope, and I have accordingly placed his reference (P. Z. S. 1878, 51) under the species from the western coast.

554. ***Heleodytes capistratus capistratus*** (Lesson).

*Picolaptes capistratus* LESSON, Rev. Zool., 1842, 174 (Realejo, Nicaragua).

*Campylorhynchus capistratus* BAIRD, Rev. Amer. Birds, 1864, 104 (Puntarenas, Costa Rica [J. M. Dow]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 92 (San Mateo [Cooper]). — FRANTZIUS, Jour. für Orn., 1869 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 64 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 191 (no Costa Rican specimens). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 389 (La Palma de Nicoya).

— ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 105 (Tárcoles and San Mateo).  
 — RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 539 (Trojas and San Mateo; critical). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 518 (San Mateo [Alfaro], La Palma de Nicoya, and Puntarenas). — UNDERWOOD, Ibis, 1896, 433 (Miravalles and Bagáces).

*Heleodytes capistratus* CABANIS, Jour. für Orn., 1860, 409 (Costa Rica [Ellendorf]).

*Heleodytes capistratus capistratus* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 504 (Guatemala to Costa Rica: Puntarenas, San Mateo, Tárcoles, Bebedéro, La Palma de Nicoya, Trojas, and Volcan de Miravalles). — BANGS, Auk, XXIV, 1907, 304 (Barranca de Puntarenas [Underwood]).

*Campylorhynchus zonatus* BOUCARD, P. Z. S., 1878, 51 (San Mateo, Costa Rica; habits).

U. S. Nat. Museum: Pígres (Zeledón), Bebedéro (Underwood), San Mateo, Trojas (Alfaro).

Bangs Collection: Bolson and Coralillo (Underwood).

C. H. Lankester Collection: Bebedéro and Mojica.

Carnegie Museum: Miravalles, Bebedéro, San Mateo, Esparta (Carriker).  
 Eleven skins.

This species is confined to the northwestern portion of the Pacific slope and lowlands, from Pígres and San Mateo northward, and from near sea-level up to about 1,500 feet. It frequents shrubbery, the edges of woodlands, roadsides, and scattering trees in pastures. It is very tame and easily approached and is always to be seen in small flocks of from three to six or eight. The birds creep around on the branches much after the manner of many of the *Dendrocolaptidæ* and are very noisy, chattering and scolding almost incessantly.

### 555. *Cistothorus polyglottus lucidus* Ridgway.

*Cistothorus elegans* ZELEDÓN, Cat. Aves de C. R., 1882, 3 (Costa Rica).

*Cistothorus polyglottus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 105, *part* (no C. R. records). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (Costa Rica).

*Cistothorus polyglottus lucidus* RIDGWAY, Proc. Biol. Soc. Wash., XVI, 1903, 169 (Boquete, Chiriquí, coll. E. A. and O. Bangs); Birds N. and Mid. Amer., III, 1904, 486 (Isthmus of Panama).

U. S. Nat. Museum: Azahar de Cartago (Alfaro; from Mus. Nac. de C. R. in 1905).

Bangs Collection: La Estrella de Cartago and Azahar de Cartago (Underwood).

Carnegie Museum: Escazu (Carriker). Two specimens.

At the time of writing Vol. III of "The Birds of North and Middle

America," Mr. Ridgway had seen no specimens of *Cistothorus* from Costa Rica, hence could not be certain that they were referable to this form. I have compared a large series of Costa Rican skins with the type of *C. l. lucidus* from Boquete, and find them exactly the same.

The bird is found in only a few places in Costa Rica, but is abundant wherever it occurs. It makes its home in the grassy marshes which are found in the vicinity of La Estrella and Azahar de Cartago at an altitude of about 5,000 feet. It has all the habits of the Marsh Wrens of North America, hence no reference is necessary to them.

#### Family CORVIDÆ.

##### 555. *Cyanolyca cucullata* (Ridgway).

*Cyanocitta ornata* SALVIN, Ibis, 1870, 114 (Costa Rica). — ZELEDÓN, Cat. Aves de C. R., 1882, 10.

*Cyanocorax cucullatus* RIDGWAY, Proc. U. S. Nat. Mus., VIII, 1885, 23 (Navarro, Costa Rica, Oct. 30, 1882 [J. Cooper]; coll. U. S. Nat. Mus.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (El Zarcero de Alajuela and Rio Súcio).

*Cyanolyca cucullata* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 127 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 323 (Isthmus of Panama to Costa Rica: Navarro, Rio Súcio, and El Zarcero de Alajuela, etc.).

U. S. Nat. Museum: La Lagunaria de Dota (Basulto).

Bangs Collection: La Hondura and Cariblanco de Sarapiquí (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: La Hondura, six specimens (Carriker), Carrillo (Underwood). Two specimens.

This species is found over the Caribbean slope from about 1,500 up to 4,000 feet, and in some places on the central plateau region at about 4,000 feet. I secured a small series at La Hondura, while in the Carnegie Museum are two skins from Carrillo, collected by Underwood. I do not think the bird is common at so low an altitude as Carrillo, but as a whole its range is lower than that of the succeeding species, though their ranges do overlap to a considerable extent. Like the succeeding species it is confined to the heavy dark forests, and goes about in small flocks, although it is rather quiet.

##### 556. *Cyanolyca argentigula* (Lawrence).

*Cyanocitta argentigula* LAWRENCE, Ann. Lyc. N. Y., XI, 1875, 88 (Talamanca, Costa Rica; coll. U. S. Nat. Mus.). — SCLATER and SALVIN, P. Z. S., 1876, 268 (critical).



*Cyanocorax argentigula* SHARPE, Cat. Birds Brit. Mus., III, 1877, 128 (Talamanca, Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Faldas de Volcan de Irazú). — RIDGWAY, Proc. U. S. Nat. Mus., XI, 1889, 541 (slopes of Irazú [Zeledón]; descr. adults and young; critical).

*Cyanolyca argentigula* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 501, pl. 34 (Costa Rican references). — RIDGWAY, Birds N. and Mid. Amer. III, 1904, 319 (eastern Costa Rica (Talamanca and Volcan de Irazú) and Chiriquí; Caribbean slope, 7,000 to 9,000 feet).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), Retes (Cooper), Irazú (Zeledón) (Cooper).

Bangs Collection: Slopes of Irazú and La Hondura (Underwood).

Carnegie Museum: La Hondura and Volcan de Turrialba (Carriker).  
Five skins.

This jay was described from specimens which were supposed to have come from Talamanca, but if they really did, it must have been from high up in the mountains of the interior, and not from the region generally meant by Talamanca. Farther to the north I secured four specimens of the species at La Hondura, high up in the upper part of the Rio Súcio valley, at an altitude of about 4,000 feet, and later a single bird on the Volcan de Turrialba at about 8,000 feet. All were shot in the heavy forest, rather high up in the trees, and did not appear to be very shy. I did not hear their note.

I should say that the species was confined to the higher portions of nearly the whole of the country, above 4,000 feet. It is not a common bird, however, and not many have been secured by collectors.

557. ***Cyanocorax affinis zeledoni*** Ridgway.

*Cyanocorax affinis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 504, *part* (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Talamanca).

*Cyanocorax affinis zeledoni* RIDGWAY, Auk, XVI, 1899, 255 (Talamanca, Costa Rica; coll. U. S. Nat. Mus.); Birds N. and Mid. Amer., III, 1904, 304 (Isthmus of Panama northward to eastern Costa Rica: Talamanca).

C. H. Lankester Collection: Banana River.

Carnegie Museum: Cuábre de Talamanca (Carriker). Five specimens.

This handsome jay is confined to the southeastern portion of Costa Rica, from the Banana River southward, from sea-level up to not more than 800 feet. I found it fairly common along the Sicsola River in the vicinity of Cuábre, but always in small flocks and very shy and hard to approach. Their note resembles a little that of *Psilorhinus*, but they are not noisy birds by any means, only uttering a few notes when disturbed,

then slipping quietly away through the tree-tops. I always saw them in the heavy forest, usually rather low down.

558. ***Psilorhinus mexicanus cyanogenys*** (Sharpe).

*Psilorhinus morio* CABANIS, Jour. für Orn., 1861, 83 (Costa Rica [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (San José and Turrialba [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 304 (Nicoya, Potrero Cerrado, and Turrialba). — BOUCARD, P. Z. S., 1878, 59 (San José).

*Pica morio* (not of Wagler) SCHLEGEL, Mus. Pays-Bas, Coraces, 1867, 44, *part* (Costa Rica).

*Psilorhinus mexicanus* SCLATER and SALVIN, P. Z. S., 1869, 363 (Costa Rica). — SALVIN, Ibis, 1869, 314 (Costa Rica; critical). — SHARPE, Cat. Birds Brit. Mus., III, 1877, 140, *part* (Costa Rica [Van Patten]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Cartago, Alajuela, and El Zarcero de Alajuela). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 496 (Irazú [Nutting]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 506, *part* (Costa Rican references). — CHERRIE, Auk, IX, 1892, 250 (San José). — UNDERWOOD, Ibis, 1896, 437 (Miravalles). — STONE, Proc. Acad. Nat. Sci. Phila., 1891, 94-96, *part* (critical; Costa Rica).

*Psilorhinus cyanogenys* SHARPE, Cat. Birds Brit. Mus., III, 1877, 140, pl. 9 (Pearl Bay, Nicaragua).

*Psilorhinus mexicanus cyanogenys* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 301 (Central America; Guatemala, Honduras, Nicaragua, and Costa Rica).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway), El Copey and Santa Maria de Dota (Basulto).

Bangs Collection: San José (Underwood).

Carnegie Museum: Guápiles (Carriker and Crawford); Cuábres (Carriker). Five skins.

This is a very common bird throughout the greater portion of Costa Rica, although very rare below 1,000 feet on the Caribbean lowlands. On the Pacific side it is commoner lower down, but seems to be entirely absent from the Terraba Valley, being found only in Nicoya and Guanacaste in small numbers.

In the plateau region it is common in all of the cultivated districts, abounding in the pastures, coffee-plantations, and scrubby woodland. It is very noisy and pugnacious, and is a perfect nuisance to the collector, following him about and screaming so loudly that it frightens away all other birds. It is usually seen in small flocks.

559. ***Calocitta formosa azurea*** Nelson.

*Calocitta formosa* SALVIN, Ibis, 1870, 114 (Costa Rica [J. Carmiol]). — SHARPE, Cat. Birds Brit. Mus., III, 1877, 88, *part* (no Costa Rican record). — NUT-

TING, Proc. U. S. Nat. Mus., V, 1882, 393 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 113 (Bagáces and Liberia). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 509, *part* (no C. R. record). — UNDERWOOD, Ibis, 1896, 437 (Miravalles).

*Calocitta formosa azurea* NELSON, Auk, XIV, 1897, 55 (Huehuetan, Chiapas, S. E. Mexico; coll. U. S. Nat. Mus.). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 296 (southern Mexico to western Costa Rica; chiefly on the Pacific slope, but occurring in southeastern Guatemala).

Bangs Collection: Bolson, Miravalles, and Tenorio (Underwood).

Carnegie Museum: Bebedéro, Miravalles, Bagáces (Carriker). Twenty skins.

This is a very abundant bird in some parts of Guanacaste, enough so to make it a nuisance to the collector, like *Psilorhinus* in the interior.

It is restricted to the central and northern portion of Nicoya and Guanacaste, and is most abundant in the hills, although found in smaller numbers in the low country of the Tempisque Valley. It frequents scrubby woodland and isolated clumps of trees, and is very noisy, the note somewhat resembling that of *Psilorhinus*, although easily distinguished.

#### Family VIREONIDÆ.

##### 560. *Cyclarhis flavipectus subflavescens* (Cabanis).

*Cyclorhis subflavescens* CABANIS, Jour. für Orn., 1860 (pub. May, 1861), 405 (highlands of Costa Rica [Hoffmann and Frantzius]). — SCLATER, Cat. Am. Birds, 1862, 359 (Costa Rica). — BAIRD, Review Am. Birds, 1866, 388 (Dota, Barránca, and San José [Carmioll]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (San José [Frantzius], Dota [F. Carmioll]). — FRANTZIUS, Jour. für Orn., 1869, 295 (San José, Dota [Carmioll]).

*Cyclorhis flavipectus subflavescens* SCLATER, Ibis, 1887, 322, *in text* (Costa Rica). — ALLEN, Bull. Am. Mus. Nat. Hist., II, 1889, 131, 134 (Costa Rica; diagnosis). — CHERRIE, Auk, IX, 1892, 23 (San José; song); Proc. U. S. Nat. Mus., XIV, 1891, 529 (Costa Rica; critical).

*Cyclorhis flaviventris* (not of Lafresnaye) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Gulf of Nicoya [coll. O. Salvin]).

*Cyclorhis flavipectus* BOUCARD, P. Z. S., 1878, 53 (San José). — GADOW, Cat. Birds Brit. Mus., VIII, 1883, 320, *part* (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 212, *part* (Tucurríqui, Bebedéro, and Nicoya [Arcé]; other C. R. references). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Dota). — SCLATER, Ibis, 1887, 322, *part* (Costa Rica). — BERLEPSCH, Ibis, 1888, 85, *part* (Costa Rica).

*Cyclarhis flavipectus subflavescens* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 230 (Chiriquí and Costa Rica: Dota, Barránca, San José, Tucurríqui, Bebedéro, Nicoya, Volcan de Irazú).

U. S. Nat. Museum: San José (Cherrie), Coliblanco (Ridgway), Monte Redondo and Pígres (Zeledón), Santa Maria de Dota (Basulto).

Bangs Collection: San José and Volcan de Irazú (Underwood).

Field Museum: Volcan de Turrialba, 5,500 feet (Carriker).

Carnegie Museum: Esparta (Carriker). One skin.

Rather a rare bird in Costa Rica, ranging over the central plateau up to at least 6,000 feet (perhaps higher) and over the Pacific slope down as low as about 1,000 feet. I met with only two birds, but was at once attracted by their beautiful song. The bird shot on the Volcan Turrialba was perched in the top of a rather small tree on the edge of a pasture, well concealed by the leaves, and singing so loudly that I heard it at some distance away, when being struck by it as something new to me I investigated and secured the bird. Mr. Cherrie also mentions this species as a beautiful and tireless songster for about five months in the year (Auk, 1892, 23).

561. **Vireolanius pulchellus viridiceps** Ridgway.

*Vireolanius pulchellus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 210, *part* (Veragua).

*Vireolanius pulchellus viridiceps* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 224 (Veragua to Panama). — BANGS, Proc. Biol. Soc. Wash., XIX, 109 (Pózo Azul de Pirrís, June 10, 1903 [Underwood]; Panaman species, new to Costa Rica).

Bangs Collection: El General de Térraba, two specimens (Underwood).

This is another of the Panaman species which gets only into the southwestern portion of the Pacific lowlands of Costa Rica, probably not much farther north than the Pirrís Valley. It is very similar to the bird of the Caribbean lowlands, differing only in having the forehead and the top of the head green, with the blue band across the nape narrower.

562. **Vireolanius pulchellus verticalis** Ridgway.

*Vireolanius pulchellus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Angostura [J. Carmiol]). — BAIRD, Review Amer. Birds, 1866, 398 (Angostura [Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 210, *part* (Orósi [Carmiol]).

*Vireolanius pulchellus verticalis* RIDGWAY, Proc. U. S. Nat. Mus., VIII, 1885, 24 (Angostura, Costa Rica, June 11, 1864 [J. Carmiol]; coll. U. S. Nat. Mus.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Costa Rica). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 529 (Costa Rica). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 224 (Nicaragua and Costa Rica: Angostura and Orósi).

U. S. Nat. Museum: Jiménez (Alfaro) (Verrill).

Bangs Collection: La Vijagua, two specimens (Underwood).

C. H. Lankester Collection: El Hogar (Carriker).

Carnegie Museum: El Hogar, March 18, 1907, ♂ and ♀ (Carriker).

Next to *Vireo pallens*, this is the rarest of the Costa Rican vireos. Very few specimens from Costa Rica are in existence, probably not more than ten or a dozen in all. It is confined to the Caribbean lowlands and foothills, up to about 1,800 feet. None have been taken higher than Angostura or La Vijagua, both of which places are about 1,500 feet above sea-level. During all the time I spent in the Caribbean lowlands I saw only the three specimens which I secured, getting first one, and on the following day two more, all at nearly the same spot, in the forest, about three miles north of the railroad. They were up in the tops of rather low trees in a partially open place, feeding much like some of the warblers or *Euphonias*.

563. ***Pachysylvia viridiflava*** (Lawrence).

*Hylophilus viridiflavus* LAWRENCE, Ann. Lyc. N. Y., VII, 1861, 324 (Panama R. R.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 208, pl. 13, fig. 1 (no Costa Rican record). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 16 (Buenos Aires, four specimens; first Costa Rican record).

*Hylophilus flavipes* (not of Lafresnaye) GADOW, Cat. Birds Brit. Mus., VIII, 1883, 212, *part* (no Costa Rican record).

*Pachysylvia viridiflava* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 221 (Isthmus of Panama north to Veragua). — BANGS, Auk, XXIV, 1907, 305 (Boruca [Underwood]).

U. S. Nat. Museum: Pígres, one ♀ (Ridgway).

Bangs Collection: El General de Térraba and Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, Buenos Aires de Térraba (Carriker). Seven specimens.

This *Pachysylvia* was first taken in Costa Rica by Mr. Cherrie in 1890-1 in the Térraba Valley, but his published record (Expl. Zool. en C. R., 1890-1, 1893, 16) seems to have been entirely overlooked by subsequent writers. It is confined to the southwestern Pacific lowlands of Costa Rica, from sea-level up to about 2,000 feet, and has been taken as far up the coast as Pígres (Ridgway). It was not at all common even as far down as the Pirrís River, but in the upper Térraba Valley, especially about Buenos Aires, I found it a fairly common bird in the low scrub around the borders of the "sabanas" and in the second-growth woodland. It does not seem to inhabit the heavy forest nearly so much as the other two Costa Rican species of the genus.

564. *Pachysylvia ochraceiceps* (Sclater).

*Hylophilus ochraceiceps* SCLATER, P. Z. S., 1859, 375 (Playa Vicente, Oaxaca, Mexico). — BAIRD, Review Am. Birds, 1866, 376 (Angostura, June 10, 1864 [J. Carmiol]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 207 (Costa Rican references). — GADOW, Cat. Birds Brit. Mus., VIII, 1883, 310 (no C. R. specimens). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Rio Súcio). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 529 (Costa Rica; crit.); Expl. Zool. en C. R., 1890-1, 1893, 16 (Lagarto, Boruca, and Térraba).

*Pachysylvia ochraceiceps pallidipectus* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 219 (southern Honduras to Chiriquí). — BANGS, Auk, XXIV, 1907, 305 (Boruca, Paso Real, Lagarto, El Pózo, and La Barranca de Térraba [Underwood]).

U. S. Nat. Museum: Pózo Pital (Cherrie).

Bangs Collection: Cerro de Santa Maria, El General and Buenos Aires de Térraba, Carrillo, La Vijagua, Tenorio, Pózo Azul de Pirrís (Underwood).

C. H. Lankester Collection: El Hogar and Miravalles.

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Pózo Azul de Pirrís, Miravalles, El Pózo de Térraba, El Hogar, Boruca (Carriker). Nineteen skins.

At the time when Mr. Ridgway separated southern specimens of *P. ochraceiceps* from the northern, under the name of *pallidipectus*, but very little material was available for comparison; but since that time large series of southern birds have been brought together, and they prove that the differences pointed out by Mr. Ridgway as diagnostic of his *pallidipectus* were only of an individual character, and that the birds from Mexico to Panama are practically alike, at least not sufficiently distinct to be worthy of subspecific separation.

The range of *Pachysylvia ochraceiceps* in Costa Rica covers the whole of the Pacific lowlands and foot-hills up to about 2,000 feet or a little lower, while on the Caribbean side it is found in the lower foot-hills, from about 800 feet upward to about 2,000 feet. It is found only in the heavy forest, and is usually to be seen going about in small bands, in company with several other species, usually some of the small arboreal *Formicariidæ*, etc. It is a common bird in the Térraba Valley, but I find no record of its presence in Talamanca.

565. *Pachysylvia decurtata* (Bonaparte).

*Sylvicola decurtata* BONAPARTE, P. Z. S., 1837, 118.

[*Pachysylvia*] *decurtata* BONAPARTE, Consp. Av., I, 1850, 309.

*Hylophilus decurtatus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Costa Rica; coll. O. Salvin). — BOUCARD, P. Z. S., 1878, 53 (San José). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 206 (Tucurríqui [Arcé]). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 391 (La Palma de Nicoya). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Pózo Azul de Pirrís). — CHERRIE, Anal. Inst. Fis.-Geog. Nac. de Costa Rica, VI, 1893, 13 (Rio Naránjo). — UNDERWOOD, Ibis, 1896, 434 (Miravalles).

*Hylophilus pusillus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Dota and Angostura [J. Carmiol]). — BAIRD, Review Am. Birds, 1866, 382 (Santa Rosa, Angostura, and Dota [Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica).

*Pachysylvia decurtata* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 216 (southern Mexico, through Central America to Isthmus of Panama). — BANGS, Auk, XXIV, 1907, 305 (Boruca and El Pózo [Underwood]).

U. S. Nat. Museum: Guayábo, Bonilla, and Pígres (Ridgway and Zeledón).

Bangs Collection: Bolson, La Vijagua, Tenorio, Coralillo, El General and Buenos Aires de Térraba, Carrillo, Miravalles, Azahar de Cartago, and Pózo Azul de Pirrís (Underwood).

C. H. Lankester Collection: Cariblanco and El Hogar.

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford); Pózo Azul de Pirrís, Miravalles, Bagáces, El Hogar, Guácimo, Rio Sicsola, Bebedero, El Pózo de Térraba, Boruca, and Buenos Aires (Carriker). Twenty-five skins.

This is the most abundant of all the vireos in Costa Rica, although rarely taken above 4,000 feet. It is a common bird throughout the forests of the lowlands of both the Caribbean and Pacific up to 2,000 feet, after which its numbers decrease rapidly. It is found in the heavy forest as well as in open woodland and shrubbery. Although such a common bird and one which I have often collected and observed, I have never found its nest or any nest which I thought might belong to it.

566. *Vireo carmioli* Baird.

*Vireo carmioli* BAIRD, Review Amer. Birds, 1866, 356 (Dota Mts., Costa Rica, July 27, 1864 [J. Carmiol]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Dota [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 203 (Irazú [Rogers]). GADOW, Cat. Birds Brit. Mus., VIII, 1883, 303. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Costa Rica). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 190 (highlands of Chiriquí and Costa Rica: Dota, "Pirrís," Volcan de Irazú).

*Vireo carmioli* ? RIDGWAY, Proc. U. S. Nat. Mus., VI, 1884, 411 ("Pirrís" = Birrís [Cooper]).

*Vireo superciliaris* "Ridgway, MS." CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 340, *in text* ("Pirrís" = Birrís [Cooper]).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), Coliblanco (Zeledón), San Juan de Irazú (Ridgway), El Copey and Las Vueltas de Dota (Basulto).

Bangs Collection: Volcan de Irazú, Azahar de Cartago, Cachí (Underwood).

Carnegie Museum: Volcan de Irazú, two ♂'s and one ♀ (Carriker).

The locality "Pirrís" given by both Messrs. Ridgway and Cherrie for the specimen taken by J. Cooper, and which Cherrie described (Ridgway MS.) as *Vireo superciliaris*, is undoubtedly an error, and should be Birrís de Cartago. Cooper never collected at Pirrís, or Pózo Azul de Pirrís, as it is commonly known, but did collect at Birrís. It is out of the question to think of getting *Vireo carmioli* at Pózo Azul, which is only a short distance above sea-level, for this bird is found only in the higher mountains, probably not occurring below 6,000 feet (except very sparingly), and certainly most commonly at about 8,000 to 9,000 feet on the volcanoes. It is an inhabitant of the heavy forest, being found rather low down among the undergrowth and low limbs of the trees, as is usual with vireos.

#### 567. *Vireo pallens* Salvin.

*Vireo pallens* SALVIN, P. Z. S., 1863, 188 (Puntarenas, Costa Rica, and Realejo, Nicaragua [O. Salvin and Capt. J. M. Dow]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Puntarenas [Salvin and Dow]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 202, pl. 12, fig. 2. — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Costa Rica). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 528 (Puntarenas, March 6, 1889 [Cherrie and Alfaro]; critical). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 194 (western Nicaragua and Costa Rica: Puntarenas).

*Vireo ochraceus* subsp. *a*, *Vireo pallens* GADOW, Cat. Birds Brit. Mus., VIII, 1883, 302.

U. S. Nat. Museum: Pígres, Feb. 3, ♂, and March 2, ♂ (Ridgway).

This is one of the extremely rare birds of Central America. It was discovered by O. Salvin and Capt. J. M. Dow at Puntarenas, Costa Rica, in 1862, where a single specimen was secured in the mangroves opposite the town on the mainland. Another specimen was taken shortly after by Salvin and Dow at Realejo, Nicaragua, not far from Puntarenas, which is now in the collection of the U. S. National Museum. The bird re-



mained unknown from that time until 1889, when Messrs. Alfaro and Cherrie took a single specimen at Puntarenas, which specimen I believe is now in the collection of the Museo Nacional de Costa Rica. The only other specimens which have been collected are two males taken by Mr. Ridgway, at Pígres, near Puntarenas, in 1905, making five specimens in all of the species which have thus far been taken, of which four came from Costa Rica.

It would seem that this bird, like the rare hummingbird, *Agyrtria boucardi*, is found only in the mangroves of the Pacific coast of Nicaragua and Costa Rica, but collecting in those places is so difficult that it would be very hard to find them, few collectors caring to spend much time at such a laborious task.

568. **Lanivireo flavifrons** (Vieillot).

*Vireo flavifrons* VIEILLOT, Ois. Am., I, 1807, 85, pl. 54 (United States).—CABANIS, Jour. für Orn., 1860, 405 (highlands of Costa Rica, Sept. [Hoffmann]). —SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 194 (Costa Rican references; Irazú [Rogers]). —GADOW, Cat. Birds Brit. Mus., VIII, 1883, 298. —ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (San José and Tárcoles). —CHERRIE, Auk, VII, 1890, 335 (San José, Oct. 25; seldom met here); IX, 1892, 23 (San José, Oct. 4, 1890; rare bird); Expl. Zool. en C. R., 1890-1, 1893, Palmár, Boruca, and Buenos Aires; four specimens, not common). —UNDERWOOD, Ibis, 1896, 434 (Miravalles).

*Vireosylva flavifrons* BAIRD, Rev. Am. Birds, 1866, 346 (Grecia, Dec., San José [Carmioli]; Puntarenas, Mar. 18, 1862 [J. M. Dow]). —BOUCARD, P. Z. S., 1878, 53 (San José, Jan., March).

*Lanivireo flavifrons* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (San José [J. Carmioli]). —FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica). —RIDGWAY, Birds N. and Mid. Amer., III, 1904, 163 (eastern U. S., breeding from Maine to Florida; in winter southward through eastern Mexico and Central America to Colombia).

U. S. Nat. Museum: Pígres, March, 1905 (Ridgway).

C. H. Lankester Collection: Cachí, Nov., 1908.

Fleming Collection: Carrillo, Nov. (Underwood).

Carnegie Museum: Guápiles, Jan. 19, 1904; El Hogar, Dec. 25, 1906 (Carriker). Two skins.

The Yellow-throated Vireo is a rare winter visitor, arriving in Costa Rica in about the same numbers as does the Red-eyed Vireo. It has been taken on the lowlands of both coasts as well as in the highlands of the interior. I suspect that it may be more abundant in the Caribbean lowlands than in any other part of the country, although I have no absolute proof to that effect.

569. *Vireosylva josephæ costaricensis* Ridgway.

*Vireo josephæ* (not of Sclater, 1859) SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 194, *part* (Costa Rican references). — GADOW, Cat. Birds Brit. Mus., VIII, 1883, 297, *part* (no Costa Rican specimens). — ZELEDÓN, An. Mus. Nac. de Costa Rica, I, 1887, 108 (Rancho Redondo).

*Vireosylva josephæ* BAIRD, Review Am. Birds, 1866, 344 (Barránca [J. Carmiol]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (Barránca [J. Carmiol], Rancho Redondo, and Dota [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica). — BOUCARD, P. Z. S., 1878, 53 (Juan Viñas).

*Vireosylva gilva* var. *josephæ* RIDGWAY, Am. Jour. Sci., IV, 1872, 456, in text, *part* (Costa Rica).

*Vireosylva josephæ costaricensis* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 159 (highlands of Costa Rica: San José, Dota, Barránca, Rancho Redondo, etc.).

U. S. Nat. Museum: El Copey and Santa Maria de Dota (Basulto); La Estrella de Cartago (Underwood).

Bangs Collection: Puriscal and Volcan de Irazú (Underwood).

Carnegie Museum: Ujurrás de Térraba (Carriker). Four specimens.

This resident *Vireosylva* is sparingly distributed over the whole of the region above 5,000 feet, inhabiting the forest. It has been taken in the mountains to the east and south of San José, on the Volcan de Irazú, and in the Dota Mountains, while I found it fairly common along the high ridges of the Cordillera de Talamanca above Ujurrás, at not less than 6,000 or 7,000 feet. It is probably not found above 8,000 feet, at least there are no records of its presence above that altitude.

570. *Vireosylva philadelphica* Cassin.

*Vireosylva philadelphica* CASSIN, Proc. Acad. Nat. Sci. Phila., V, 1851, 153 (near Philadelphia, Pennsylvania; coll. Acad. Nat. Sci. Phila.). — BAIRD, Review Amer. Birds, 1866, 341 (San José, Jan. 12, 1864 [J. Carmiol]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (San José [J. Carmiol], Grecia, and Dota [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica). — BOUCARD, P. Z. S., 1878, 53 (San José, several). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 151 (eastern North America, breeding from Hudson Bay southward; in winter over southern U. S. to Central America, Guatemala to Chiriquí and Veragua, there being no Mexican or West Indian records). — BANGS, Auk, XXIV, 1907, 305 (Boruca, one ♂ [Underwood]).

*Vireo philadelphicus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 191 (no C. R. record). — GADOW, Cat. Birds Brit. Mus., VIII, 1883, 296 (no C. R. record). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Cartago). — CHERRIE, Auk, VII, 1890, 335 (San José; one noted Apr. 23, 1889); IX, 1892, 23 (San José, earliest arrival Oct. 21); Expl. Zool. en C. R., 1890-1, 15 (Palmar, Lagarto, Boruca, and Térraba). — UNDERWOOD, Ibis, 1896, 434 (Miravalles, fairly plentiful).

U. S. Nat. Museum: Bonilla, April 7, 1905 (Zeledón).

Bangs Collection: Tenorio, Feb. 10; Cerro de Santa Maria, Jan. 8, 1908 (Underwood).

Carnegie Museum: Juan Viñas, March 11, 1902, and April 22, 1907; El Hogar, Nov. 13, 18, 1906 (Carriker). Four skins.

The Philadelphia Vireo is evidently more common in Costa Rica in winter than the Red-eyed Vireo. It has been taken on both the Caribbean and Pacific lowlands and on the central plateau. The birds were fairly numerous at El Hogar all through November, 1906, at which time there was a large flight of migrants of various species. While there they were always seen in the trees scattered through the pastures not far from the house and among the fruit-trees in the immediate vicinity of the farm buildings.

571. *Vireosylva olivacea* (Linnæus).

*Muscicapa olivacea* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 327, *part.*

*Vireo olivaceus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 88 (Costa Rican references). — GADOW, Cat. Birds Brit. Mus., VIII, 1883, 294 (Dota Mountains [Carmioli]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Costa Rica). — CHERRIE, Auk, VII, 1890, 335 (San José, Oct. 9 to Apr. 20), IX, 1892 (San José; not common anywhere or at any time in Costa Rica); Expl. Zool. en C. R., 1890-1, 1893, 15 (Boruca, two specimens). — UNDERWOOD, Ibis, 1896, 434 (Miravalles).

*Vireosylva olivacea* BAIRD, Review Am. Birds, 1866, 333 (San José [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (San José [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica). — BOUCARD, P. Z. S., 1878, 53 (San José, Jan. to May). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 147 (temperate North America in general, wintering through Mexico, Central America, and South America as far as southern Brazil and Bolivia).

*Phyllomanes olivaceus* CABANIS, Jour. für Orn., 1860, 404 (highlands of Costa Rica [Hoffmann]).

U. S. Nat. Museum: Bonilla, April 8-9, 1908 (Basulto); April 7, 1905 (Zeledón); Santa Maria de Dota, May 7, 1908 (Basulto).

Fleming Collection: San José, Sept. 28, 1898 (Underwood).

Carnegie Museum: Carrillo, August 31, 1905; San Sebastian, Oct. 28, 1905 (Carriker). Two skins.

The Red-eyed Vireo is a regular winter visitor to Costa Rica, although in small numbers. There are no records of its presence in the lowlands of either the Pacific or Caribbean, the lowest point at which it has been taken on the eastern side being at Carrillo (about 1,200 or 1,500 feet) and on the western side at Boruca (1,500 feet).

572. *Vireosylva flavoviridis flavoviridis* Cassin.

*Vireosylva flavoviridis* CASSIN, Proc. Acad. Nat. Sci. Phila., 1851, 152, pl. 11 (Panama; coll. Acad. Nat. Sci. Phila.). — BAIRD, Review Am. Birds, 1866, 336 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 295 (San José). — BOUCARD, P. Z. S., 1878, 53 (San José). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 391 (La Palma de Nicoya).

*Vireosylva flavo-viridis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (San José [Frantzius], Atenas [Cooper]).

*Vireo flavoviridis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 189, part (Costa Rican references). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (San José, Alajuéla, Tambor de Alajuéla). — CHERRIE, Auk, VII, 1890, 329-331 (San José; habits; descr. nest and eggs); 335 (San José, middle of April to Sept. 29); Expl. Zool. en C. R., 1890-1, 1893, 15 (Lagarto, Térraba, and Buenos Aires). — UNDERWOOD, Ibis, 1896, 434 (Miravalles).

*Phyllomanes flavoviridis* CABANIS, Jour. für Orn., 1861, 93 (Costa Rica).

*Vireo agilis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (San Juan).

*Vireosylva flavoviridis flavoviridis* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 144 (from northern Mexico to Isthmus of Panama, and southward to Ecuador, Peru, and Bolivia). — BANGS, Auk, XXIV, 1907, 305 (Boruca, Paso Real, and Barránca de Térraba [Underwood]).

U. S. Nat. Museum: San José (Ridgway and Zeledón) (Cherrie) (Alfaro); Alajuéla (Alfaro).

Acad. Nat. Sci. Philadelphia: San José, Monte Redondo, and Aguacate Mts. (Underwood).

Bangs Collection: El General, Buenos Aires, Carrillo, San José, El Mojón (Underwood).

Carnegie Museum: San José, Guaitíl, Boruca, Buenos Aires, Esparta, Puntarenas, Miravalles, Bebedéro (Carriker). Nineteen skins.

This is the most abundant vireo in Costa Rica in the region of the highlands as well as over the whole of the Pacific slope and lowlands. In life it resembles exceedingly its near relative, *V. olivaceus*, both in song, habits, and habitat, although in many ways it also resembles the Warbling Vireo (*V. gilva gilva*), especially in the construction of the nest. I took a nest of the species at Puntarenas, June 8, 1907, containing three fresh eggs. The nest was a beautiful structure, very compact, and well made of weed-fibres and bark, covered over on the outside with golden and white spider-webs and spider egg-cases, and lined with fine, round, pale brown fibres, exactly after the manner of the Warbling Vireo. The eggs are white, speckled and dotted sparingly over the whole surface with deep burnt-umber brown. The nest was suspended from a horizontal fork among the thick foliage of a fruit-tree of some tropical variety, about

fifteen feet from the ground, and not more than a hundred feet from a house on the outskirts of the town.

Family PTILOGONATIDÆ.

573. *Ptilogonys caudatus* Cabanis.

*Ptilogonys caudatus* CABANIS, Jour. für Orn., 1860 (pub. May, 1861), 402 (Volcan de Irazú, Costa Rica [Frantzius]). — BAIRD, Rev. Am. Birds, 1866, 413 ("San José" and Rancho Redondo). — SCLATER and SALVIN, Exotic Orn., pt. i, 1866, pl. 6 (2 figs.). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 ("San José" [Carmirol], Irazú [Cooper]). — FRANTZIUS, Jour. für Orn., 1869, 296 (Potrero Cerrado). — BOUCARD, P. Z. S., 1878, 53 (Vol. de Irazú and Navárrro). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 219 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 224 (Volcan de Irazú [Zeledón and Arcé]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Volcan de Irazú, La Palma de San José, Rancho Redondo). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 118 (highlands of Chiriquí and Costa Rica: Volcan de Irazú, "San José," Rancho Redondo, Navárrro).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San Juan de Irazú (Ridgway), Coliblanco (Ridgway), El Copey and Las Vueltas de Dota (Basulto).

Bangs Collection: La Estrella de Cartago, Slopes of Barba, Volcan de Irazú, and Azahar de Cartago (Underwood).

Carnegie Museum: Volcan de Irazú and Volcan de Turrialba (Carriker). Seven skins.

This beautiful *Ptilogonys* is very abundant on the high volcanoes, just below timber-line, extending downwards in lessening numbers to about 6,000 feet, which I believe to be the lowest altitude at which it is found. There must be an error in Lawrence's record for this bird from San José, for I am sure it does not descend to 3,500 feet.

Family AMPELIDÆ.

574. *Ampelis cedrorum* (Vieillot).

*Bombycilla cedrorum* VIEILLOT, Ois. Am., I, 1807, 88, pl. 57.

*Ampelis cedrorum* SCLATER, P. Z. S., 1856, 299 (Mexico). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 215 (no record south of Guatemala). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 215 (no C. R. record). — CHERRIE, Auk, VIII, 1891, 395 (Volcan de Irazú, Costa Rica, 6000 feet, April 11). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 109 (temperate North America in general, migrating southward to the Bahamas, West Indies, Mexico, and Central America to highlands of Costa Rica: Volcan de Irazú).

U. S. Nat. Museum: Guayábo, March 9, 1908, 2 ♂'s (Ridgway and Zeledón).

Univ. of Nebraska: Volcan de Irazú, February, 1902 (Carriker).

Bangs Collection: San Pedro, May 4-18, 1892, 2 ♂'s-♀ (Zeledón).

The only published record for the taking of the Cedar Waxwing in Costa Rica is that by Mr. Cherrie (cited above). In addition to the specimen taken by him, Mr. Ridgway secured two at Guayábo. Mr. Bangs has three taken by Zeledón at San Pedro, while I secured another high up on the Volcan de Irazú. It is evidently only a rare straggler so far to the south, for were it a regular winter visitor, it would have attracted the attention of native collectors.

They are usually to be seen in small flocks of from four to a dozen, and are fond of frequenting the scattered trees of the pastures as well as the forest.

575. *Phainoptila melanoxantha* Salvin.

*Phainoptila melanoxantha* SALVIN, P. Z. S., 1877, 367 (San Francisco, Costa Rica [Rogers]; coll. Salvin and Godman). — BOUCARD, P. Z. S., 1878, 53 (Navárrro and Rancho Redondo, several). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 221, pl. 14 (San Francisco de Irazú [Rogers!]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 219 (Irazú district). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (La Palma de San José, Rancho Redondo). — ALFARO, Gaceta Of. no. 288, 1888 (Volcan de Póas). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 124 (highlands of Costa Rica and Chiriquí).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San Juan de Irazú (Ridgway), La Estrella de Cartago and Burgos de Irazú (Castro).

Bangs Collection: Volcan de Irazú, Escazú, and Azahar de Cartago (Underwood).

Carnegie Museum Collection: Volcan de Irazú, Volcan de Turrialba, Ujurrás de Térraba, La Hondura (Carriker). Ten skins.

This species has about the same range as *Ptilogonys caudatus*, being distributed over the higher mountains of the whole of Costa Rica, from about 5,000 feet upwards to timber-line on the volcanoes. I found it fairly common at La Hondura, on the northern slope of Irazú at about 5,000 feet. Some of the species inhabiting the high altitudes descend much lower on the northern and northeastern slopes of the Volcanoes Irazú and Turrialba than they do anywhere else in the country, the slope being so abrupt there, that the temperature remains cool at a much lower altitude than where foothills or table-lands intervene. It is also abundant on the Volcan de Turrialba, while I secured a single specimen at Ujurrás de Térraba, in the Cordilleras de Talamanca at about 7,000 feet. The nidification of this species is also unknown.

## Family HIRUNDINIDÆ.

576. *Tachycineta thalassina lepida* (Mearns).

*Hirundo thalassina* (not of Swainson) ORNITHOLOGICAL COMMITTEE, Jour. Acad. Nat. Sci. Phila., VII, 1837, 193 (Columbia River).

*Tachycineta thalassina* COUES, Proc. Acad. Nat. Sci. Phila., 1866, 72 (Arizona). — (?) CHERRIE, Auk, XII, 1895, 87 (Matina River, Atlantic side; Bebedéro, Pacific side, Costa Rica).

*Tachycineta lepida* MEARNS, Proc. Biol. Soc. Wash., XV, 1902, 31 (San Diego Co., California).

*Tachycineta thalassina lepida* AMERICAN ORNITHOLOGISTS' UNION COMMITTEE, Auk, XIX, 1902, 325. — RIDGWAY, Birds N. and Mid. America, III, 1904, 95 (western North America, breeding southward to southern California; in winter to southern highlands of Guatemala and Costa Rica: Matina River, Atlantic side; Bebedéro, Pacific side).

The Violet-green Swallow is only accidental in Costa Rica, if found at all. The only records we have from that country are two skins in the Museo Nacional de Costa Rica, from the Matina River and from Bebedéro, reported by Mr. Cherrie to be this species. There are no specimens in this country from Costa Rica, nor is it reported south of Guatemala in the "Biologia" and the "Catalogue of the Birds of the British Museum."

577. *Iridoprocne albilinea* (Lawrence).

*Petrochelidon albilinea* LAWRENCE, Ann. Lyc. N. Y., VIII, 1863, 2 (Panama; coll. G. N. Lawrence). — SALVIN, Ibis, 1866, 192 (Guatemala to Panama, both coasts).

*Hirundo albilinea* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, pl. 15, fig. 1.

*Tachycineta albilinea* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 235 (no C. R. record). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 115, 631 (Puntarenas [Salvin and Godman]). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 486 (Rio Frio). — CHERRIE, Expl. Zool. en C. R., 1890-1, 1893, 16 (near Palmar, on Rio Grande de Térraba).

*Iridoprocne albilinea* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 90 (coast districts of middle Mexico southward through Central America (both coasts) to Isthmus of Panama and down Pacific coast to Peru). — BANGS, Auk, XXIV, 1907, 305 (Barranca de Puntarenas [Underwood]).

Bangs Collection: Limon and La Junta (Underwood).

Carnegie Museum: El Pózo de Térraba (Carriker). One skin.

This swallow is found at various points along both coasts wherever there are cliffs or rocky bluffs affording nesting sites. Such conditions are much more common on the Pacific coast than along the Caribbean. The birds do not confine themselves to the coast, but go up the large rivers for long

distances. I saw a large colony in a rocky gorge on the Rio Grande de Térraba between Palmar and Lagarto, which were nesting in the rocks. Mr. Cherrie also mentions this colony as having been there in 1892 (Expl. Zool. en C. R., 1890-1, 1893, 16). After the breeding season they spread up and down the rivers for long distances from their breeding grounds.

578. ***Hirundo erythrogastra*** Boddaert.

*Hirundo erythrogaster* BODDAERT, Tabl. Pl. Enl., 1783 (based on *Hirondelle a ventre roux de Cayenne*, Daubenton, Pl. Enl., VII, pl. 724, fig. 1). — UNDERWOOD, Ibis, 1896, 435 (Miravalles).

*Hirundo erythrogastra* RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 499 (San José [Nutting]).

*Chelidon erythrogaster* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107. — CHERRIE, Auk, IX, 1892, 222 (San José; common Sept. till March).

Bangs Collection: Buenos Aires de Térraba (Underwood).

Fleming Collection: San José, Sept. and Oct.; Los Cuádro, Sept. 16 (Underwood).

Carnegie Museum: Guácimo, Oct. 1, 1903; Juan Viñas, April 17-18, 1907 (Carriker). Three skins.

The Barn Swallow is a common migrant over the whole of the plateau and both slopes. In fact it is found over the whole country wherever there is sufficient open ground to give feeding places. I saw it at Juan Viñas until about the last of April, 1907, when it disappeared. It is more abundant in the highlands than in the low, hot regions.

579. ***Riparia riparia*** (Linnæus).

*Hirundo riparia* LINNÆUS, Syst. Nat. ed. 10, I, 1758, 192.

*Cotile riparia* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 240 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 97, 630 (no C. R. specimens).

*Cotile riparia* CABANIS, Jour. für Orn., 1861, 93 (Costa Rica). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (reference to Cabanis' record, *antea.*). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica).

*Clivicola riparia* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Costa Rica).

*Riparia riparia* AMERICAN ORNITHOLOGISTS' UNION COMMITTEE, Auk, XIX, 1902, 325. — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 73 (northern hemisphere; in America breeding from Arctic regions south to northern Mexico, wintering through Mexico, Central and South America as far as eastern Peru and Brazil).

Bangs Collection: Los Cuádro de Irazú (Underwood).

Fleming Collection: San José, Sept. 4; Los Cuádro de San Pedro, Sept. 20 (Underwood).



Carnegie Museum: Juan Viñas, April 18, 1907 (Carriker).

The Bank Swallow is evidently not a common migrant in Costa Rica. Very few specimens are recorded, and recent collectors seem to have missed it or else it does not come there in any numbers. I saw a few birds at Juan Viñas during April in company with *Hirundo erythrogastra* and *Stelgidopteryx serripennis*, which spent their whole time either in feeding over a meadow and along a road or else perched on a telephone wire. There are no records for the lowlands, either of the Pacific or Caribbean, and it is quite probable that the birds remain in the highlands.

580. ***Pygochelidon cyanoleuca*** (Vieillot).

*Hirundo cyanoleuca* VIEILLOT, Nouv. Dict. d'Hist. Nat., XIV, 1817, 509 (Paraguay).

*Atticora cyanoleuca* CABANIS, Jour. für Orn., 1860, 401 (San José); 1861, 92 (Costa Rica). — SALVIN, P. Z. S., 1870, 184 (Barránca and San José [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 229. — SHARPE, Cat. Birds Brit. Mus., X, 1885, 186, *part*, 634 (Irazú district [Rogers], Tucurríqui [Arcé]).

*Atticora cyanoleuca*, var. *montana* BAIRD, Review Am. Birds, 1865, 310 (Barránca and San José [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (San José and Barránca [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica). — BOUCARD, P. Z. S., 1878, 67 (San José and Cartago; breeding in April).

*Atticora cyanoleuca montana* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Navárro de Cartago, Zarcéro de Alajuéla, Alajuéla). — CHERRIE, Auk, IX, 1892, 22 (San José; common resident).

*Pygochelidon cyanoleuca* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 69 (Costa Rica: San José, Tucurríqui, Navárro de Cartago, Alajuéla, etc., southward over the whole of South America to southern Brazil, Bolivia, and Peru). — BANGS, Auk, XXIV, 1907, 306 (Boruca, Paso Real, and Barránca de Térraba [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Guayabal (Underwood).

Bangs Collection: San José, Escazú, Carrillo, La Hondura, Juan Viñas (Underwood).

Carnegie Museum: Juan Viñas and Boruca (Carriker).

This is the most abundant resident swallow in Costa Rica and is distributed over nearly the whole of the country wherever conditions will permit of its presence. I found it very abundant at Boruca and Buenos Aires, where it had been nesting in the grass-thatch roofs of the houses. It is more partial to regions where open meadows are numerous.

581. *Stelgidopteryx ruficollis uropygialis* (Lawrence).

*Cotyle uropygialis* LAWRENCE, Ibis, 1863, 181 (Panama R. R.; coll. G. N. Lawrence).

*Stelgidopteryx uropygialis* BAIRD, Review Am. Birds, 1865, 317 (Isthmus of Panama). — SALVIN, Ibis, 1870, 109 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 238, *part* (Angostura, Costa Rica). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 209, *part* (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Costa Rica). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 486 (Rio Frio).

*Stelgidopteryx ruficollis uropygialis* BANGS, Proc. New Eng. Zool. Club, II, 1901, 59 (Panama; Chiriquí; Costa Rica; descr.). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 63 (eastern Nicaragua and Costa Rica to western Ecuador). — BANGS, Auk, XXIV, 1907, 305 (El Pózo de Térraba [Underwood]).

*Stelgidopteryx fulvigula* BAIRD, Review Am. Birds, 1865, 318 (Angostura, Costa Rica; coll. U. S. Nat. Mus.; *juv.*). — FRANTZIUS, Jour. für Orn., 1869, 295 (Costa Rica). — SALVIN, Ibis, 1869, 313, *in text* (critical; refers it to *S. fulvipennis* Sclater).

U. S. Nat. Museum: Bonilla (Ridgway).

Bangs Collection: Pózo Azul de Pirrís, El General de Térraba, and Carrillo (Underwood).

C. H. Lankester Collection: Guácimo.

Fleming Collection: Carrillo (Underwood).

Carnegie Museum: Guápiles (Carriker). Two skins.

This is a well-marked bird, and need not be confused with the other forms of *Stelgidopteryx* in Costa Rica, being easily distinguished by the rufous throat and black tips to the under tail-coverts.

It has been taken on both the Caribbean and Pacific slopes from 800 to 2,000 feet, and probably is found over the whole of the lowlands and foothills. I found the birds breeding at Guápiles.

582. *Stelgidopteryx serripennis salvini* (Ridgway).

(?) *Stelgidopteryx fulvipennis* SALVIN, Ibis, 1870, 109, 114 (Costa Rica). — BOUCARD, P. Z. S., 1878, 67 (San José).

*Stelgidopteryx fulvigula* (not of Baird) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (Atiro, C. R.).

(?) *Stelgidopteryx serripennis* (not *Hirundo serripennis* Audubon) ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107, *part* (Costa Rica). — CHERRIE, Auk, VII, 1890, 335 (San José; very common during the rainy season); IX, 1892, 22 (San José; breeding abundantly). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 237, *part* (Costa Rica).

*Stelgidopteryx salvini* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 62 (Duenas, Guatemala, Oct. 17, 1859, O. Salvin; coll. U. S. Nat. Mus.; southwestern Mexico and Guatemala to Chiriquí).

*Stelgidopteryx serripennis salvini* RIDGWAY, Birds N. and Mid. Amer., III, 1904, Addenda, p. 739 (crit.).

In Mr. Bangs' collection are two birds of this race from Chiriquí, but I have seen none from Costa Rica. It seems to me that the real status of this form is not quite clear, and that additional material may throw more light on the Central American forms of the genus as a whole. As it is now, the synonymy seems to be rather involved, and there is no means of making it clear without seeing many of the specimens referred to by various authors.

583. *Stelgidopteryx serripennis serripennis* (Audubon).

*Hirundo serripennis* AUDUBON, Orn. Biog., IV, 1838, 593 (Charleston, South Carolina; type in the U. S. Nat. Museum).

*Stelgidopteryx serripennis* BAIRD, Rept. Pacific Railway Surv., IX, 1858, 312; Review Am. Birds, 1865, 314 (Angostura, June, 1864 [Carmioli]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 237, *part* (Costa Rica). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 206, 636, *part* (Costa Rica). — RIDGWAY, Birds N. and Mid. Am., III, 1904, 58 (temperate N. Amer., south in winter through Mexico and Central America to Costa Rica).

(?) *Stelgidopteryx fulvipennis* BOUCARD, P. Z. S., 1878, 67 (San José, March to May).

Bangs Collection: Juan Viñas, March 10 to May 12; Pózo Azul de Pirrís, May 17 (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Juan Viñas, Mar. 19 and April 18; Miravalles, May 28 and June 9 (Carriker). Four skins.

It is clearly evident that many individuals of this species which are found in Costa Rica are only winter migrants, but it is equally clear that the bird breeds there and is resident the year round. I found quite a colony of the birds nesting along the road between Guaitíl and Sabanilla de Pirrís in May, 1902, and caught a female on the nest. This bird was a perfectly typical specimen of *S. s. serripennis*, without a trace of the rufous on the throat as found in *S. s. salvini*.

There is every shade of intergradation between true *serripennis* and *salvini*, and in some instances there are even traces of the black spot on the under tail-coverts as found in *S. ruficollis uropygialis*, there being a skin in Mr. Bangs' collection from Texolo, V. C., Mexico, with a large sooty spot on the tips of the coverts, and one skin from Juan Viñas, Costa Rica, with a trace of the same.

584. *Petrochelidon lunifrons tachina* Oberholser.

*Petrochelidon lunifrons* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Costa Rica). — RIDGWAY, Proc. U. S. Nat. Mus., XI, 1888, 540 (San José [Alfaro], Talamanca).

*Petrochelidon swainsoni* (not of Sclater) (?) SHARPE, Cat. Birds Brit. Mus., X, 1885, 194, 635, *part* (Costa Rica).

*Petrochelidon lunifrons tachina* OBERHOLSER, Proc. Biol. Soc. Wash., XVI, 1903, 15 (Texas, coll. U. S. Nat. Mus.). — RIDGWAY, Birds N. and Mid. Amer., III, 1904, 50 (southwestern Texas and eastern Mexico, southward in winter to Costa Rica and Panama).

Bangs Collection: Laguna de Cartago (Underwood).

Carnegie Museum: La Estrella de Cartago, Nov. 5, 1907 (Carriker).  
One skin.

The Lesser Cliff Swallow is a very rare winter resident in Costa Rica, the capture of but few specimens being on record. Mr. Bangs has one specimen, and I secured but one. It seems to be found only in the highlands, the two birds cited above both having been taken above 5,000 feet.

585. *Progne chalybea chalybea* (Gmelin).

*Hirundo chalybea* GMELIN, Syst. Nat., I, 1788, 1026 (based on *Hirondelle de Cayenne*, *Hirundo cayennensis* BRISSON, Orn., II, 495, pl. 46, fig. 1).

*Progne chalybea* CABANIS, Jour. für Orn., 1860, 402 (San José, Costa Rica [Hoffmann]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 225 (Nicoya [Arcé]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 178, 633 (Costa Rica [Carmioli]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (San José). — CHERRIE, Auk, IX, 1892, 23 (San José; nesting habits).

*Progne leucogaster* BAIRD, Rev. Amer. Birds, 1865, 280 (San José [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (San José [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica).

*Progne leucogaster* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 391 (La Palma de Nicoya).

*Progne chalybea chalybea* RIDGWAY, Birds N. and Mid. Amer., III, 1904, 40 (southeastern Mexico through Central America to Peru and Bolivia). — BANGS, Auk, XXIV, 1907, 305 (Boruca and Paso Real de Térraba [Underwood]).

U. S. Nat. Museum: Bonilla; El Copey and Santa Maria de Dota (Bassalto); Pózo Azul de Pirris (Zeledón).

Bangs Collection: San José and Cerro de Santa Maria (Underwood).

Carnegie Museum: Pózo Azul de Pirris, Miravalles, Bagáces, Boruca (Carriker). Five skins.

The Gray-breasted Martin is found over the whole of the central highlands and the Pacific slope and lowlands, but is rare or wanting on the lower parts of the Caribbean watershed. Its habits are the same as those of the Purple Martin of North America.

## Family MNIOTILTIDÆ.

586. *Rhodinocichla rosea eximia* Ridgway.

*Rhodinocichla rosea* (not of Sclater, 1855, not *Furnarius roseus* Lesson) FRANTZIUS, Jour. für Orn., 1869, 291 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1879, 38, *part* (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., VI, 1881, 366, *part* (Costa Rica). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 4 (Buenos Aires de Térraba; descr. of male and female). — RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 609 (Buenos Aires; critical).

*Rhodinocichla rosea eximia* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 770 (Isthmus of Panama north to southern Costa Rica). — BANGS, Auk, XXIV, 1907, 306 (Boruca [Underwood]).

Bangs Collection: El General and Boruca de Térraba (Underwood).

Carnegie Museum: Boruca and Buenos Aires de Térraba (Carriker).

Fourteen skins.

This handsome species is confined to southwestern Costa Rica, and has been taken as far north only as El General in the upper part of the Térraba Valley. Its range extends from about 800 feet up to 2,000 feet, where it inhabits almost exclusively low scrubby woodland and second-growth scrub, keeping near the ground. (For further notes on habits, etc., see Introduction, page 331.)

587. *Basileuterus semicervinus leucopygius* (Sclater and Salvin).

*Basileuterus uropygialis* (not of Sclater) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 95 (Angostura and Tuís [J. Carmiol]). — BOUCARD, P. Z. S., 1878, 52 (San Carlos). — SALVIN, Ibis, 1867, 136 (Tucurríqui [Arcé]).

*Basileuterus leucopygius* SCLATER and SALVIN, Nom. Av. Neotr., 1873, 156 (Costa Rica; coll. P. L. Sclater). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 172, *part* (Tucurríqui [Arcé]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 402 (Costa Rican references). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Angostura and Tuís). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 485 (Rio Frio). — UNDERWOOD, Ibis, 1896, 434 (Miravalles).

*Basileuterus semicervinus leucopygius* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 390 (La Palma de Nicoya). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 757 (southern Honduras to Costa Rica: Angostura, Rio Frio, Tuís, Tucurríqui, Volcan de Miravalles, La Palma de Nicoya, and San Carlos).

U. S. Nat. Museum: Carrillo (Underwood), Reventazón (Carranza).

Bangs Collection: La Vijagua, Cariblanco de Sarapiquí, Tenorio, Carrillo (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), Guácimo, El Hogar (Carriker), four skins; Cariblanco de Sarapiquí and Carrillo (Underwood), two skins.

This interesting warbler is found over the whole of the Caribbean foothills and upper part of the lowlands, ranging from about 500 to 2,000 feet; also on the Pacific slope from the Rio Grande de Tárcoles northward, including the whole of Nicoya and Guanacaste, at about the same altitudes. It is always found along the margins of little streams flowing through the forest, where it feeds among the rocks and along the banks. The birds have the peculiar habit of constantly raising and lowering the tail as they stand or hop from rock to rock, and are very shy and hard to approach within shooting range.

588. ***Basileuterus semicervinus veraguensis*** (Sharpe).

*Basileuterus leucopygius* subsp. *a.* *Basileuterus veraguensis* SHARPE, Cat. Birds Brit. Mus., X, 1885, 403 (Paraiso Station, Panama R.R.; coll. Brit. Mus.).

*Basileuterus veraguensis* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 14 (Boruca and Buenos Aires); Expl. en el Rio Naránjo, 1893, 12 (Rio Naránjo; habits; song; crit.).

*Basileuterus semicervinus veraguensis* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 756 (Isthmus of Panama, northward to southwestern Costa Rica: Rio Naránjo, Boruca, and Buenos Aires). — BANGS, Auk, XXIV, 1907, 306 (Boruca and Paso Real de Térraba [Underwood]; critical).

Bangs Collection: El General and Buenos Aires de Térraba, Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Paso Real, Boruca, Buenos Aires de Térraba, Pózo Azul de Pirrís (Carriker). Seven skins.

Costa Rican specimens exhibit a considerable amount of variation, some being typical *veraguensis* and others coming near to *leucopygius*, due, I suppose, to the close proximity of the ranges of the two subspecies, which in this intermediate area tend to intergrade. In spite of this variation I think that all specimens taken from the Pirrís Valley, southward, may be referred without question to the southern race.

The habits and habitat of the two races is exactly the same, so far as I observed.

589. ***Basileuterus culicivorus culicivorus*** (Lichtenstein).

*Sylvia culicivora* LICHTENSTEIN, Preis-Verz. Mex. Vög. 1830, 2, no. 78 (Mexico, see Jour. für Orn., 1863, 67).

*Basileuterus culicivorus* CABANIS, Mus. Hein., I, 1850, 17 (Jalapa, Mexico). — BAIRD, Rev. Am. Birds, 1865, 245 (Barránca, Costa Rica, Mar. 17, 1864 [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 95 (Barránca and Guaitíl [J. Carmioli], Grecia and Dota (?) [F. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica). — BOUCARD, P. Z. S., 1878, 52 (San José). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 171, *part* (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 383, *part*

(Guaitíl [J. Carmiol]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Sabanilla de Alajuéla, Naránjo de Cartago, Dota (?)).

*Basileuterus culicivorus culicivorus* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 753 (southern Mexico, Guatemala, and Costa Rica: Barránca, Guaitíl, Dota Mts., San José, Naránjo de Cartago, Monte Redondo, Sabanilla de Alajuéla).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Juan Viñas (Cooper), Cedral de Asseri (Underwood), El Copey, La Lagunaria, and Santa Maria de Dota (Basulto).

Bangs Collection: Miravalles, Tenorio, Cerro de Santa Maria, La Vija-gua, El General (Underwood).

Carnegie Museum: Miravalles, Guaitíl, La Estrella de Cartago, Juan Viñas, Ujurrás de Térraba, Peralta (Carriker). Twenty-one skins.

In "Birds of North and Middle America," Mr. Ridgway refers all Costa Rican birds of this species to *B. c. culicivorus*, with the exception of specimens from San Marcos, which he had not seen, and which Cherrie had referred to *B. c. godmani*.

I have been able to examine birds from points much farther south than San Marcos (El General and Ujurrás de Térraba) and find that while they are not typical *culicivorus* they are nearer to that form than to *godmani*. True *godmani* from Chiriquí is a very different bird, and when the two are brought together the differences become very apparent, it having the entire upper parts very olivaceous, with scarcely a trace of the gray which is so prominent on *culicivorus*; it is also a much larger bird.

It therefore becomes evident that all Costa Rican specimens collected in the eastern and northern parts of the country are typical or nearly typical *B. c. culicivorus*, while those from the southwestern region are slightly intermediate between that form and *B. c. godmani* but with a decided relationship to *culicivorus* rather than to *godmani*.

This is a very common bird in nearly all parts of Costa Rica, from 600 to 7,000 feet above sea-level. It is perhaps most numerous between 1,500 and 4,000 feet, and is less abundant in the southwestern region than in any other part of the country. It is found not only in the forest, but in open woodland, isolated trees in pastures, and along roadsides. It is also often seen in small bands, as well as singly or in company with other species.

#### 590. *Basileuterus melanotis* Lawrence.

*Basileuterus melanotis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 95 (Cervántes, Costa Rica [J. Carmiol]; coll. U. S. Nat. Mus.; also Birris [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica). — SHARPE, Cat. Birds

Brit. Mus., X, 1885, 386( Costa Rica [Van Patten]). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 752 (highlands of Veragua, Chiriquí, and Costa Rica: Cervántes, Birrís).

*Basileuterus bivittatus melanotis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Costa Rica).

*Basileuterus bivittatus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 170 (Costa Rican references).

U. S. Nat. Museum: Coliblanco (Ridgway), La Lagunaria, and Santa Maria de Dota (Basulto).

Bangs Collection: Azahár de Cartago and Escazú (Underwood).

Carnegie Museum: La Hondura, Juan Viñas (Carriker). Five skins.

This is rather a rare bird in Costa Rica, the least common of the genus. Its range, so far as known, is confined to the highlands, from about 3,000 up to 6,000 feet, or perhaps higher. Like the other members of the genus it is an inhabitant of the forest, keeping rather high up in the smaller trees and undergrowth.

#### 591. *Basileuterus melanogenys* Baird.

*Basileuterus melanogenys* BAIRD, Review Am. Birds, 1865, 248 (San José?, Costa Rica [Frantzius]; coll. U. S. Nat. Mus.) — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 95 (San Jose(?)) [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 174 (Volcan de Irazú [Rogers]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 398 (Costa Rican references). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (La Palma de San José). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 528 (descr. of young; Costa Rica). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 751 (highlands of Chiriquí and Costa Rica: La Palma and Volcan de Irazú).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), El Copey, Las Vueltas, and La Lagunaria de Dota (Basulto), Alto de Póas (Alfaro), La Estrella de Cartago, Volcan de Irazú and Azahár de Cartago (Mus. Nac. de C. R.).

Bangs Collection: Azahár de Cartago and Volcan de Irazú (Underwood).

C. H. Lankester Collection: Volcan de Turrialba.

Carnegie Museum: Volcan de Irazú, Ujurrás de Térraba (Carriker). Twelve skins.

The type of this species, collected by Frantzius, was given as coming from San José, but this is unquestionably an error. In the first place, the labelling of Frantzius' skins is absolutely worthless and not to be depended upon whenever they conflict with the commonly known range of a species; furthermore it is very clear, that while making San José his



headquarters while collecting in the surrounding region, he placed the locality name of San José on everything, regardless of the fact that it might have been collected 3,000 feet or more higher up.

This handsome *Basileuterus* is confined to the higher portion of the plateau and the high mountains above it, ranging from about 6,000 feet nearly if not quite up to timber-line on the high volcanoes. I found it rather rare on the Volcanoes de Irazú and Turrialba, but very abundant in the higher portions of the Talamanca Cordillera above Ujurrás. The birds go about in small bands of from six to ten or more, flitting from branch to branch in the low trees and underbrush of the heavy forest. They are very tame, allowing one to approach them quite closely before flying away, in fact they will fly and alight so close to a person that it is impossible to shoot them without retreating a few steps. They have a low musical chirp, which is frequently uttered as they fly about in their restless search for food.

592. ***Basileuterus rufifrons mesochrysus*** (Sclater).

*Basileuterus mesochrysus* SCLATER, P. Z. S., 1860, 251 (Bogotá, Colombia; coll. P. L. Sclater). — SALVIN and GODMAN, Biol. Centr.-Am., I, 1881, 176, *part* (no reference to localities occupied by this subspecies).

[*Basileuterus delatirii*] subsp. *a.* *Basileuterus mesochrysus* SHARPE, Cat. Birds Brit. Mus., X, 1885, 396, *part*.

*Basileuterus delatirii mesochrysus* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 342, *in text* (crit.).

*Basileuterus delatirii* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 14 (Boruca and Buenos Aires).

*Basileuterus rufifrons mesochrysus* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 750 (Colombia, Panama, and Chiriquí). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 36 (Buenos Aires and El General [Underwood]; crit.).

*Basileuterus rufifrons delatirii* BANGS, Auk, XXIV, 1907, 306 (Boruca and Paso Real [Underwood]).

Bangs Collection: Boruca, Paso Real, El General and Buenos Aires de Térraba (Underwood).

Carnegie Museum: Buenos Aires, Boruca (Carriker). Six skins.

Mr. Bangs has given the correct distribution for the two races of *B. rufifrons* in Costa Rica (Proc. Biol. Soc. Wash., XXII, 1909, 36), correcting his previous error in the determination of the birds from Boruca. When the series of skins from the Térraba Valley is compared with others from Chiriquí, Panama, and Colombia, no differences can be found, while all specimens from other parts of Costa Rica are decidedly referable to the northern race.

It is in Costa Rica confined to the southwestern Pacific coast region,

embracing the higher parts of the whole of the Térraba basin, from about 600 up to 2,000 feet or higher.

The species frequents open woodland, scattering trees, the borders of the savannas and second-growth scrub. It is not an abundant bird in Costa Rica.

593. ***Basileuterus rufifrons delatirii*** (Bonaparte).

*Basileuterus delatirii* BONAPARTE, Compt. Rend. XXXVIII, 1854, 383 (Nicaragua). — CABANIS, Jour. für Orn., 1860, 325 (highlands of Costa Rica [Frantzius, Hoffmann, and Ellendorf]). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 340 (Costa Rica; crit.); 527 (San José; descr. young); Auk, IX, 1892, 22 (San José; descr. nest and eggs).

*Basileuterus mesochrysus* (not of Sclater, 1860) BAIRD, Review Am. Birds, 1865, 250 (San José [Carmioll]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 95 (San José, Grecia, and Guaitíl [J. Carmioll]). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica). — BOUCARD, P. Z. S., 1878, 52 (San José and Cartago). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 176, *part* (Costa Rican references). — NUTTING, Proc. U. S. Nat. Mus., V, 1882, 499 (San José). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (San José, Alajuéla, Juan Viñas, Grecia, and Monte Redondo). — UNDERWOOD, Ibis, 1896, 434 (Miravalles).

[*Basileuterus delatirii*] subsp. *a.* *Basileuterus mesochrysus* SHARPE, Cat. Birds Brit. Mus., X, 1885, 396, *part* (Volcan de Irazú [Rogers], Grecia [Carmioll]).

*Basileuterus rufifrons delatirii* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 749 (Nicaragua and Costa Rica: San José, Cartago, San Juan, Guaitíl, Grecia, Alajuéla, etc.). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 36, *in text* (Tenorio and Cerro de Santa Maria).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Santa Maria de Dota (Basulto), San José (Cherrie) (Alfaro) (Underwood).

Bangs Collection: Tenorio, Cerro de Santa Maria, San José (Underwood).

C. H. Lankester Collection: Guanacaste and Cachí.

Carnegie Museum: San José (Underwood), Juan Viñas, Esparta, La Hondura, Bagáces (Carriker). Eight skins.

A common warbler all over the highlands of Costa Rica from 2,000 up to 4,000 feet on both the Caribbean and Pacific slopes, except the Térraba Valley. On the Pacific slope it extends to a lower altitude than on the Caribbean, being found in small numbers as low as 500 feet above sea-level in the Tempisque Valley. Its habits are the same as those of the preceding form.

594. ***Myioborus torquatus*** (Baird).

*Setophaga torquata* BAIRD, Review Am. Birds, 1865, 261 (San José, Costa Rica [Frantzius]; coll. U. S. Nat. Mus.). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (San José and La Palma [Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 294 (La Palma). — BOUCARD, P. Z. S., 1878, 53 (Volcan de Irazú). —

SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 183, pl. 10, fig. 2 (Costa Rican references). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 495 (Volcan de Irazú [Nutting]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 424 (Irazú [Rogers], La Palma [Frantzius]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Volcan de Irazú).

*Myioborus torquatus* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 735 (highlands of Chiriquí and Costa Rica: San José, La Palma, La Candelaria, Volcan de Irazú, etc.).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), El Copey and Las Vueltas de Dota (Basulto), La Estrella de Cartago and Burgos de Irazú (Castro), Achióte de Póas (Alfaro).

Bangs Collection: Volcan de Irazú and Escazú (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Volcan de Irazú, La Hondura, Ujurrás de Térraba (Carriker). Ten skins.

This handsome little bird is confined to the highlands, ranging the whole length of the country from about 3,500 feet up to timber-line on the high volcanoes. It is most abundant on the eastern side of the mountains in the humid forests at an elevation of about 5,000 to 8,000 feet. It lives in the heavy forest, where it is found low down among the lower branches of the trees, the underbrush, and even on the ground. It is fond of hopping about over masses of fallen trees in small openings in the forest, and is quite tame and easily approached.

#### 595. *Myioborus aurantiacus* (Baird).

*Setophaga flammea* (not of Kaup) CABANIS, Jour. für Orn., 1860, 325 (Costa Rica, highlands [Hoffmann and Frantzius]). — BAIRD, Review Am. Birds, 1865, 259, *part* (reference to Cabanis).

[*Setophaga miniata*] subspecies *a*, *Setophaga flammea* SHARPE, Cat. Birds Brit. Mus., X, 1885, 419, *part* (Costa Rica).

*Setophaga aurantiaca* BAIRD, Review Am. Birds, 1865, 261 (Dota, Costa Rica; coll. U. S. Nat. Mus.). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (Grecia and Barránca [F. Carmiol], Dota [J. Carmiol]). — SALVIN, Ibis, 1869, 313 (Costa Rica; *crit.*). — FRANTZIUS, Jour. für Orn., 1869, 294 (Barránca and Candelaria; Dota Mts. [Carmiol]). — BOUCARD, P. Z. S., 1878, 53 (Cartago and Juan Viñas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 182 (Turrialba and Tucurríqui [Arcé]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 421 (San José [Frantzius], Irazú [Rogers]). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 528 (Costa Rica; *crit.*); Expl. en el Rio Naránjo, 1893, 13 (Rio Naránjo). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Cartago and Dota).

*Myioborus aurantiacus* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 733 (highlands of Chiriquí and Costa Rica: Dota, Grecia, Barránca, Cartago, Naránjo,

Turrialba, Tucurríqui, Candelaria). — BANGS, Proc. New Eng. Zool. Club, IV, 1908, 30 (crit. — restricts species to Costa Rica).

U. S. Nat. Museum: Guayábo and Coliblanco (Ridgway and Zeledón), La Lagunaria, El Copey, and Santa Maria de Dota (Basulto).

Bangs Collection: Escazú, Tenorio, and Cerro de Santa Maria (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Ujurrás de Térraba, Juan Viñas, La Hondura (Carriker). Twelve skins.

This species is also confined to the highlands but ranges a little lower than the preceding, being found from about 2,000 feet up to 7,000, thus partly overlapping the range of *torquatus*. Their habits are very similar, except that the present form is more frequently found in partly open spots, especially along roadsides which traverse the forests, where they flit along from bush to bush very much like Juncos (*Junco hyemalis*), the white in the tail adding to the resemblance.

#### 596. *Setophaga ruticilla* (Linnæus).

*Motacilla ruticilla* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 186 (based on the Redstart, *Ruticilla americana* CATESBY, Nat. Hist. Carolina, I, 67, pl. 67).

*Setophaga ruticilla* SWAINSON, Philos. Mag., n. s., I, 1827, 368. — CABANIS, Jour. für Orn., 1860, 325 (highlands of Costa Rica [Hoffmann and Frantzius]). — BAIRD, Review Am. Birds, 1865, 261 (Barránca, Angostura, and Turrialba [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 96 (Angostura [J. Carmiol], Turrialba [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 294 (plain of San José, August). — BOUCARD, P. Z. S., 1878, 52 (San José and Cartago). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 178 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 411 (Volcan de Irazú [Rogers]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (San José, Tárcoles, Juan Viñas, Alajuela). — CHERRIE, Auk, VII, 1890, 337 (San José, August 13 to March 6); IX, 1892, 22; Expl. Zool. en C. R., 1891-2, 1893, 14 (Boruca). — UNDERWOOD, Ibis, 1896, 434 (Miravalles). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 724 (temperate North America in general, south in winter through the West Indies, Mexico, and Central America to northern South America).

U. S. Nat. Museum: Guayábo, March 3-19, 1908 (Ridgway and Zeledón).

Bangs Collection: Bolson, Dec. 25; San Pedro del Mojón, October (Underwood).

Fleming Collection: Carrillo, Oct. 15; San José, Sept. 9 (Underwood).

Carnegie Museum: San José, Oct. 20-21 (Underwood); Rio Sicsola, August 17, 1904; El Hogar, August 16, 1906 (Carriker). Five skins.

This is one of the most abundant of the migrant warblers to be found in Costa Rica, ranging over the whole country from sea-level to not less than 6,000 or 7,000 feet. It arrives about the middle of August, but does not remain as late in the spring as some other species.

597. *Wilsonia canadensis* (Linnæus).

[*Muscicapa*] *canadensis* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 327 (based on *Gobe-mouche cendre de Canada*, *Muscicapa canadensis cinerea*, BRISSON, Orn., II, 406, pl. 39, fig. 4).

*Myiodiactes canadensis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 95 (Dota [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 166 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 432 (Irazú district [Rogers]). — UNDERWOOD, Ibis, 1896, 434 (Miravalles).

*Euthlypis canadensis* CABANIS, Jour. für Orn., 1860, 326 (highlands of Costa Rica, Sept. [Hoffmann]).

*Sylvania canadensis* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Jiménez). — CHERRIE, Auk, VII, 1890, 337 (San José, Sept. 29; abundant during October).

*Wilsonia canadensis* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 716 (eastern North America, south in winter through eastern Mexico and Central America to Ecuador).

Bangs Collection: San José, Oct. 20 (Underwood).

Acad. Nat. Sci. Philadelphia: Miravalles, Oct. 2 (Underwood).

Fleming Collection: Carrillo, Oct. 12 (Underwood).

Carnegie Museum: Rio Sicsola, Sept. 21–26, and Oct. 7 (Carriker). Four skins.

This warbler is fairly abundant in the eastern part of Costa Rica during late September and October, but after that seems to pass on further south, and few are seen later. On the return in spring it evidently does not stop. It is found on the Pacific slope, and in the plateau region also, but in smaller numbers.

598. *Wilsonia pusilla pusilla* (Wilson).

*Muscicapa pusilla* WILSON, Am. Orn., III, 1811, 103, pl. 26, fig. 4.

*Wilsonia pusilla* BONAPARTE, Geog. and Comp. List, 1838, 23.

*Wilsonia pusilla pusilla* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 710 (eastern North America, south in winter to Santo Domingo and eastern Mexico). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 36 (Tenorio, Feb. 1, 1908, ♀; Cerro de Santa Maria, Jan. 4 and 8, 1908, two ♂'s [Underwood]).

The above record lately published by Mr. Bangs furnishes the first authentic evidence we have of the presence of this bird in Costa Rica.

There can be no question of the identity of the specimens, Mr. Ridgway having examined them and pronounced them to be *W. p. pusilla*. They were taken in the extreme northwestern portion of the country, on the Pacific slope, and no specimens of *W. pusilla pileolata* were taken on the trip, from which we may infer that that region is not visited by *W. p. pileolata*. This is certainly an extraordinary distribution, the eastern form of the bird being taken only on the Pacific slope of Costa Rica, while the western race of the same species occupies the whole of the remainder of the region in great numbers.

599. ***Wilsonia pusilla pileolata* (Pallas).**

*Motacilla pileolata* PALLAS, Zoogr. Rosso-Asiat., 1826, 497 (Kadiak Island, Alaska).

*Sylvania pusilla pileolata* CHERRIE, Auk, VII, 1890, 337 (San José, Costa Rica, Oct. 27 to March 6; most abundant warbler). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Dota, Cartago).

*Myiodioides pusillus*  $\beta$ . *M. pileolatus* SHARPE, Cat. Birds Brit. Mus., X, 1885, 437 (Barránca [Carmioli], Irazú district [Rogers]).

*Myiodioides pusillus* CABANIS, Jour. für Orn., 1860, 325 (highlands of Costa Rica, Sept. [Hoffmann and Frantzius]). — FRANTZIUS, Jour. für Orn., 1869, 294 (plain of San José, August; Póas, March). — BOUCARD, P. Z. S., 1878, 52 (San José, January). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 95 (Barránca and Grecia [J. Carmiol], San José [Frantzius]). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (Volcan de Irazú [Nutting]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 168 (Irazú [Rogers]. Orósi [Kramer]).

*Wilsonia pusilla pileolata* COUES, Bull. Nutt. Orn. Club, V, 1880, 95, *part.* — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 712 (western North America, south in winter over the whole of Mexico and Central America to Chiriquí). — BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 36, *in text* (high elevations in central and southern Costa Rica).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San Juan de Irazú, Coliblanco, April and May (Ridgway).

Bangs Collection: Volcan de Irazú (Underwood), Dec. 3 to 30.

C. H. Lankester Collection: Cachí.

Carnegie Museum: Volcan de Irazú, April 7 to 12; Cuábres, March 2; Guápiles, Jan. 20; La Hondura, Sept. 22; Juan Viñas, April 19 (Carriger). Nine skins.

A very common migrant in Costa Rica, covering in abundance the whole of the Caribbean slope down to sea-level and up to timber-line on the high volcanoes. There are no records for either race of *W. pusilla* in southwestern Costa Rica, and only for *W. p. pusilla* in the northwestern part. The present form is found over the whole region of the central plateau, but evidently does not occupy the lower parts of the Pacific slope.

600. *Wilsonia citrina* (Boddaert).

*Muscicapa citrina* BODDAERT, Table Pl. Enl., 1783, 41.

*Wilsonia citrina* A. O. U. Committee, Auk, XXV, 1908, 384.

C. H. Lankester Collection: El Hogar, Costa Rica, Nov. 8, 1905, one male.  
Carnegie Museum: Guácimo, Oct. 26, 1903, one female (Carriker).

The two birds cited above furnish the only records which I have been able to find of the taking of this species in Costa Rica. It has been taken in Panama. It would seem that it is a rare straggler along the Caribbean lowlands, at least during the autumn. I did not see the bird again in that region, although I always watched for it.

601. *Icteria virens virens* (Linnæus).

[*Turdus*] *virens* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 171 (based on the *Yellow-breasted Chat*, *Oenanthe americana, pectore luteo*, CATESBY, Nat. Hist. Carolina, I, 50, pl. 50).

*Icteria virens* BAIRD, Review Am. Birds, April, 1865, 228. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 95 (Costa Rica). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (San José). — CHERRIE, Auk, VII, 1890, 337 (San José, Oct. 26 and March 1 to 5); Expl. Zool. en C. R., 1891-2, 1893, 14 (Lagarto, one specimen).

*Icteria viridis* CABANIS, Jour. für Orn., 1860, 403 (Costa Rica [Hoffmann]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 157, *part* (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 373 (no C. R. reference or specimens).

*Icteria virens virens* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 692 (eastern U. S., south in winter through eastern Mexico and Central America to Costa Rica: San José, Lagarto). — BANGS, Auk, XXIV, 1907, 306 (El Pózo de Térraba, April 9, 1906 [Underwood]).

C. H. Lankester Collection: Guácimo, Dec. 18, 1906, one male.

A very rare migrant in Costa Rica, but seemingly found in all parts of the country, having been taken on both the Caribbean and Pacific lowlands and in the plateau region.

602. *Chamæthlypis caninucha* Ridgway.

*Geothlypis poliocephala* (not of Baird) SALVIN, Ibis, 1870, 114 (Costa Rica [J. Carmiol]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 359, *part* (Costa Rica).

*Geothlypis poliocephala*, var. *caninucha* BOUCARD, P. Z. S., 1878, 52 (San José, Costa Rica).

*Geothlypis caninucha* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 153, *part* (Costa Rica). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 107 (Los Anonos). — UNDERWOOD, Ibis, 1896, 434 (Miravalles).

*Geothlypis caninucha icterotis* RIDGWAY, Proc. U. S. Nat. Mus., XI, 1889, 539

(Costa Rica [Van Patten], San José [Alfaro]). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 527 (San José; crit.); Auk. IX, 1892, 22 (San José, resident).

*Geothlypis palpebralis* (not of Ridgway) LANTZ, Trans. Kansas Acad. Sci., 1896-7 (1900), 223 (San Juan Valley, Costa Rica).

*Chamathlypis caninucha* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 689 (Central America, from Guatemala to Chiriquí). — BANGS, Auk, XXIV, 1907, 306 (Boruca, Paso Real, and Barránca de Térraba [Underwood]).

U. S. Nat. Museum: San José (Cherrie).

Bangs Collection: Tenorio, Miravalles, San José, San Pedro del Moján (Underwood).

Carnegie Museum: San José, Miravalles, Bagáces, Boruca (Carriker). Nineteen skins.

This Yellow-throat is confined to the Pacific slope of the plateau and the whole of the Pacific slope proper, down to about 1,000 feet, a few straggling lower in Guanacaste in the Tempisque Valley. It is found in wet pastures, as well as in any kind of grassy land where there are thick clumps of bushes in which it can hide. It was an abundant bird in the pastures around Miravalles and in the Térraba Valley, where every little patch of savanna contained one or more pairs. It is very shy and skulks close to the ground and in the bushes, making it hard to shoot.

### 603. *Geothlypis semiflava bairdi* (Nutting).

*Geothlypis bairdi* NUTTING, Proc. U. S. Nat. Mus., VI, 1883, 398 (Los Sabalos, Nicaragua; coll. U. S. Nat. Mus.). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 527 (San José; critical). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 485 (Rio Frio).

*Geothlypis semiflava bairdi* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 682 (southern Honduras and eastern Nicaragua to Costa Rica: Jiménez, Talamanca, San José, etc.).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón), Talamanca and Jiménez (Cherrie), Naránjo de Cartago (Juan Viñas) (Zeledón), Reventazón (Carranza), Jiménez (Verrill).

Bangs Collection: Carrillo and Cariblanco de Sarapiquí (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Volcan de Turrialba, 2,000 feet (Carriker & Crawford), Juan Viñas, Guápiles, Rio Sicsola, Carrillo, El Hogar (Carriker), ten skins, Juan Vinas, Cariblanco de Sarapiquí, and Jiménez (Underwood), four skins.

This form is confined strictly to the lower slopes and lowlands of the



Caribbean, not often being found higher than 3,000 feet, and much more abundantly below 1,500 feet. It occurs in wet meadows, bushy pastures, and even in open woodland, usually keeping well hidden in the grass or low vegetation.

604. *Geothlypis trichas brachidactyla* (Swainson).

*Geothlypis trichas* CABANIS, Jour. für Orn., 1861, 84 (Costa Rica [Frantzius]). — LAWRENCE, Ann. Lyc. N. Y. IX, 1868, 94 (reference to Cabanis' record). — FRANTZIUS, Jour. für Orn., 1869, 293 (San José, August; rare in Costa Rica). — BOUCARD, P. Z. S., 1878, 52 (San José and Cartago). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 150 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 351, pl. 9, fig. 1 (no Costa Rican specimens). — CHERRIE, Auk, VII, 1890, 336 (San José, April 29; no fall records); IX, 1892, 21 (San José; only five taken in three years).

*Trichas brachidactylus* SWAINSON, Anim. in Menag., 1838, 295 ("northern provinces of the United States").

*Geothlypis trichas brachidactyla* PALMER, Auk, XVII, 1900, 221 (crit.). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 664 (northeastern U. S. and southeastern British Provinces, south in winter to the Bahamas, West Indies, Mexico, Guatemala, Nicaragua, and Costa Rica: Rio Frio, San José, Cartago).

I did not secure specimens of the Northern Yellow-throat in Costa Rica, nor has Mr. Bangs any from Underwood's collection. From what Mr. Cherrie says (but five birds taken in three years) it must be a very rare winter visitor so far south as Costa Rica, and when it does get that far, probably remains in the highlands.

605. *Seiurus noveboracensis noveboracensis* (Gmelin).

*Siurus naevius* SHARPE, Cat. Birds Brit. Mus., X, 1885, 343, 652, *part* (no Costa Rica references).

*Seiurus noveboracensis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (San José [Frantzius], Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 293 (San José, Oct. and Nov.; Angostura, March 13). — CHERRIE, Auk, VII, 1890, 336 (San José, Sept. 14 to May 21); IX, 1892, 21 (San José, Sept. 15 to May 30, twenty specimens); Expl. Zool. en C. R., 1891-2, 1893, 13 (Boruca, one specimen). — UNDERWOOD, Ibis, 1896, 434 (Miravalles).

*Siurus noveboracensis* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 145 (Costa Rican references). — BOUCARD, P. Z. S., 1878, 51 (San José, March).

*Henicocichla noveboracensis* CABANIS, Jour. für Orn., 1860, 324 (Costa Rica [Frantzius]).

*Seiurus noveboracensis noveboracensis* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 642. (Eastern North America, south in winter through the West Indies and eastern coastal districts of Central America to Colombia). — BANGS, Auk, XXIV, 1907, 306 (El Pózo de Térraba, April 8, 1906 [Underwood]).

Bangs Collection: Bolson, Dec. 28, 29, 1908; Boruca, Apr. 8, 1906 (Underwood).

Carnegie Museum: Escazú, Aug. 13, 1902 (Carriker). One female.

A rare winter visitor in the highlands. There is no certainty that all the references cited above refer to this bird, a portion possibly belonging to *S. n. notabilis*, for which I have one record. However, since many are authentic specimens of true *noveboracensis*, and since I know of but a single specimen of *notabilis* from Costa Rica, it is probably better to place all Costa Rican references under this subspecies.

606. *Seiurus noveboracensis notabilis* Ridgway.

*Seiurus noveboracensis notabilis* RIDGWAY, Proc. U. S. Nat. Mus., VIII, 1885, 354, 564 (Cozumel Island, Yucatan).

U. S. Nat. Museum: Pígres, March, 1905 (Ridgway).

This is the only authentic record for Grinnell's Water-thrush for Costa Rica.

607. *Seiurus motacilla* (Vieillot).

*Turdus motacilla* VIEILLOT, Ois. Am., II, 1807, 9, pl. 65 (Kentucky).

*Seiurus motacilla* CORY, Birds of Haiti and San Dom., 1885, 35. — CHERRIE, Auk, VII, 1890, 336 (San José, one skin, March 9, 1889). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 639 (eastern U. S. and southern Ontario, south in winter to West Indies, Mexico (both coasts), and Central America to Colombia).

*Siurus motacilla* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 147 (Costa Rican reference). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 342 (no Costa Rican specimens).

*Seiurus ludovicianus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Barránca [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 293 (Costa Rica).

Bangs Collection: Volcan de Irazú, Oct. 13 (Underwood).

Carnegie Museum: Rio Sicsola, Sept. 3, 1904; El Hogar, August 28, 1906 (Carriker). Two skins.

This species seems to be a little more plentiful than the two preceding, and is fairly abundant in the Caribbean lowlands, especially during September and October. After that it disappears, probably moving farther south.

608. *Seiurus aurocapillus* (Linnæus).

*Motacilla aurocapilla* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 334 (based on the *Golden-crowned Thrush*, *Turdus vertice aureo*, EDWARDS, Gleanings Nat. Hist., V, 91, pl. 253).

*Seiurus aurocapillus* SWAINSON, Zool. Jour., III, 1827, 171; Philos. Mag., n. s., I, 1827, 369 (Mexico). — BAIRD, Review Am. Birds, 1868, 214 (Barránca, Apr. 16, 1864 [J. Carmiol]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 46 (Barránca [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 293 (San José,

August; Barránca, April). — BOUCARD, P. Z. S., 1878, 51 (San José, Jan., March). — CHERRIE, Auk, VII, 1890, 336 (San José, one specimen, Oct. 27, 1889); IX, 1892, 21 (San José; three specimens in Costa Rica); Expl. Zool. en C. R., 1891-2, 1893, 12 (Boruca, Térraba, Buenos Aires). — UNDERWOOD, Ibis, 1896, 434 (Miravalles). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 635 (eastern North America, north to Nova Scotia; in winter, Gulf coast of U. S., Bahamas, Greater Antilles, Mexico, and Central America to Chiriquí). — BANGS, Auk, XXIV, 1907, 306 (Boruca and El Pózo, Apr. 12 to May 6 [Underwood]).

*Henicocichla aurocapillus* CABANIS, Jour. für Orn., 1861, 84 (Costa Rica [Frantz]).

*Siurus aurocapillus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 144 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 339 (no Costa Rican specimens).

Bangs Collection: Bolson, Dec. 20; La Vijagua, Feb. 20; Cerro de Santa Maria, Jan. 5; Coralillo, April 6 (Underwood).

C. H. Lankester Collection: Banana River.

Fleming Collection: Azahár de Cartago, Oct. 5; Pózo Azul de Pirris, Feb. 18 (Underwood).

Carnegie Museum: San José, Oct. 28 (Underwood); Guácimo, Oct. 26; Tucurríqui, Nov. 2 (Carriker). Four skins.

A fairly common winter visitor over the greater part of the country, covering both coastal plains, the slopes, and the central plateau, October 5 to May 6.

#### 609. *Oporornis tolmiei* (Townsend).

*Geothlypis macgillivrayi* CABANIS, Jour. für Orn., 1861, 84 (Costa Rica [Frantz]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Barránca [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 294 (San José, August; Barránca [Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 155 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 364 (no Costa Rican specimens). — CHERRIE, Auk, VII, 1890, 336 (San José, Sept. 28, one specimen); IX, 1892, 22 (only three skins in Mus. Nac. de C. R.); Expl. Zool. en C. R., 1891-2, 1893, 14 (Térraba, two skins).

*Sylvia tolmiei* TOWNSEND (J. K.), Narrative, April, 1839, 343 (Columbia River; type in U. S. Nat. Mus.).

*Oporornis tolmiei* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 631 (western U. S. and British Columbia, south in winter to Cape St. Lucas, and over the whole of Mexico and Central America to Colombia).

Fleming Collection: San José, Sept. 25, 1898, ♀ (Underwood).

A rare migrant to the highlands of Costa Rica, and one not often taken by collectors.

610. *Oporornis philadelphia* (Wilson).

*Sylvia philadelphia* WILSON, Am. Orn., II, 1810, 101, pl. 14, fig. 6 (near Philadelphia, Pennsylvania, June).

*Geothlypis philadelphia* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Angostura and Dota [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 294 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 154 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 366 (Angostura [Carmiol]). — CHERRIE, Auk, VII, 1890, 336 (San José, rare; last seen Apr. 27, 1890, first return for 1890, Sept. 1); IX, 1892, 22 (San José; not common from Sept. 15 to April 1).

*Oporornis philadelphia* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 628 (eastern U. S. and British Provinces; south in winter to Nicaragua, Costa Rica, Chiriquí, and Colombia). — BANGS, Auk, XXIV, 1907, 306 (El Pózo de Térraba, April 11-27, three specimens [Underwood]).

U. S. Nat. Museum: Guayábo, March 18, 1908 (Ridgway and Zeledón), San José (Cherrie).

Am. Mus. Nat. History: San José, Sept. 30 (Underwood).

Bangs Collection: Cerro de Santa Maria, Jan. 4; San José, Oct. 20; Boruca, April 27 (Underwood).

Carnegie Museum: Escazú, March 19; Juan Viñas, March 16 and 20 (Underwood); Guápiles, Jan. 11 and 20; Cuábre, March 2; Rio Sicsola, Sept. 24 and Oct. 7; Peralta, Nov. 10 (Carriker). Ten skins.

This warbler is fairly common during the winter in the Caribbean lowlands, but rare in the highlands and on the Pacific slope. It seems to prefer the cool damp forests of the eastern side to the dry conditions which prevail in other regions after December 1.

611. *Oporornis formosa* (Wilson).

*Sylvia formosa* WILSON, Am. Orn., III, 1811, 85, pl. 25, fig. 3 (Kentucky).

*Oporornis formosus* BAIRD, Rep. Pacific Railway Surv., IX, 1858, 247. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Dota Mts. and Angostura [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 293 (Costa Rica).

*Oporornis formosa* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 148 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 348, 653 (no Costa Rican specimens). — CHERRIE, Auk, IX, 1892, 21 (San José, Oct. 7, one ♀); Expl. Zool. en C. R., 1891-2, 1893, 22 (Boruca, two specimens). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 622 (eastern United States, south in winter to Cuba (accidental), and through southern Mexico and Central America to northern Colombia). — BANGS, Auk, XXIV, 1907, 306 (El Pózo de Térraba, April 4 to 17, two ♂'s [Underwood]).

*Geothlypis formosa* CHERRIE, Auk, VII, 1890, 336 (one skin in Museo Nac. de C. R., without date).

*Oporornis formosa* UNDERWOOD, Ibis, 1896, 434 (Miravalles).

Bangs Collection: La Vijagua, March 4; Tenorio, Jan. 28 to Feb. 1; Pózo Azul de Pirrís, Feb. 20 (Underwood). Twelve skins.

Carnegie Museum: Guápiles, Jan 10; Rio Sicsola, Sept. 21 and Oct. 8; El Hogar, Dec. 6 and Nov. 14 (Carriker). Five skins.

Apparently a fairly common migrant in Costa Rica, much more so than many other warblers which reach there. It is met with in greater numbers in the Caribbean lowlands than in any other part of the country, being less common in the highlands. It is always found in the thick forest, especially in brush and all kinds of undergrowth.

612. *Dendroica pensylvanica* (Linnæus).

[*Motacilla*] *pensylvanica* LINNÆUS, Syst. Nat. ed. 12, I, 1766, 33 (based on *The Red-throated Flycatcher, Muscicapa gutture rubro*, EDWARDS, Gleanings Nat. Hist., II, 193, pl. 301).

*Dendroica pensylvanica* PARKER, Am. Nat., V, 1871, 168. — CHERRIE, Auk, VII, 1890, 336 (San José, Costa Rica, Sept. 28 to Apr. 24); Expl. Zool. en C. R., 1891-2, 1893, 13 (Lagarto, Boruca, Térraba, Buenos Aires). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 589 (eastern U. S. and Canada, south in winter through eastern Mexico and Central America to Isthmus of Panama). — BANGS, Auk, XXIV, 1907, 306 (El Pózo de Térraba, April 6 and 9 (Underwood).

*Dendræca pensylvanica* BOUCARD, P. Z. S., 1878, 52 (San Carlos, Feb.).

*Dendroica pennsylvanica* FRANTZIUS, Jour. für Orn., 1869, 293 (Costa Rica). — CHERRIE, Auk, VIII, 1891, 278 (San José; remarks on plumage).

*Dendræca pennsylvanica* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Grecia and Barranca [F. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 131 (Angostura [J. Carmiol]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 285 (Irazú district [Rogers]). — UNDERWOOD, Ibis, 1896, 433 (Miravalles).

*Dendroica icterocephala* CABANIS, Jour. für Orn., 1860, 328 (Costa Rica).

U. S. Nat. Museum: Guayábo, Feb. 9 to 18 (Ridgway and Zeledón); Bonilla, April 8 to 10 (Basulto).

Bangs Collection: Tenorio, Feb. 7; Cerro de Santa Maria, Jan. 5; La Vijagua, Feb. 28; Bolson, Dec. 15; Boruca, Apr. 6 (Underwood).

Fleming Collection: Carrillo, Oct. 19 to 29, Feb. 12; San José, Sept. 25 (Underwood).

Carnegie Museum: Tierra Blanca, Apr. 11; Guácimo, Nov. 14; Guápiles, Jan. 19; La Honduras, Sept. 27; El Hogar, Dec. 12, Nov. 13, 18 (Carriker); Guápiles, March 9 to 28 (Carriker & Crawford); Jiménez, Jan.; Juan Viñas, March 14 to 21 (Underwood). Sixteen skins.

The most abundant of the migrating warblers in Costa Rica, found from

sea-level up to at least 7,000 feet. Very few fully adult birds are seen, nearly all taken having but little or no chestnut streaking on the under parts.

613. *Dendroica dominica albilora* Ridgway.

*Dendroica dominica* (not *Motacilla dominica* Linnæus) (?) CHERRIE, Auk, IX, 1892, 21 (San José; saw one male in the park).

*Dendroica dominica*, var. *albilora* Baird, RIDGWAY, Am. Nat., VII, 1873, 605 (Belize, Brit. Hon.; coll. U. S. Nat. Mus.).

*Dendroica dominica albilora* RIDGWAY, Bull. Nutt. Orn. Club, III, 1878, 163 (Mt. Carmel, Ill.); Birds N. and Mid. Amer., II, 1902, 582 (Mississippi Valley, south in winter through Mexico and Central America to eastern Nicaragua).

Bangs Collection: San José, Sept. 17, one skin (Underwood).

There seems to be but one actual authentic record of the taking of this species in Costa Rica, the specimen in Mr. Bangs' collection, cited above. Cherrie records having seen a male in the park at San José, but it was not taken.

614. *Dendroica fusca* (Müller).

*Motacilla fusca* MÜLLER, Syst. Nat. Suppl., 1776, 175 (based on *Figuier Etranger* Daubenton, Pl. Enl., pl. 58, fig. 3).

*Dendroica blackburniæ* FRANTZIUS, Jour. für Orn., 1869, 293 (San José, Barránca, and Atiro). — CHERRIE, Auk, VII, 1890, 336 (San José, Sept. 8 to Feb. 9); VIII, 1891, 278 (San José; remarks on plumage). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 574 (eastern U. S., south in winter through eastern Mexico and Central America to Peru and Ecuador).

*Dendroica blackburniæ* CABANIS, Jour. für Orn., 1860, 328 (highlands of Costa Rica, Sept. [Hoffmann and Frantzius]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (San José and Atiro [J. Carmiol], Barránca [F. Carmiol]). — BOURCARD, P. Z. S., 1878, 52 (Juan Viñas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 133 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 288, 646 (no C. R. specimens). — UNDERWOOD, Ibis, 1896, 433 (Miravalles).

*Dendroica fusca* VON BERLEPSCH, Novit. Zool., XV, 1908, 315 (Cayenne).

U. S. Nat. Museum: Bonilla, April 8 to 10 (Basulto); Guayábo, Feb. 8 to 29 (Ridgway and Zeledón); Coliblanco, April and May (Ridgway).

Bangs Collection: Escazú, Oct. 28 (Underwood).

C. H. Lankester Collection: Cachí and Cariblanco de Sarapiquí.

Fleming Collection: San José, Sept. 10 to 13; Carrillo, Oct. 31 to Nov. 16 (Underwood).

Carnegie Museum: La Hondura, Sept. 19 to Oct. 1; Ujurrás de Térraba, Sept. 12 (Carriker). Twelve skins.

A common migrant in the highlands, from 1,200 to 4,000 feet, but very rarely taken below 1,200.

615. *Dendroica cerulea* (Wilson).

*Sylvia cerulea* WILSON, Am. Orn., II, 1810, 141, pl. 17, fig. 5.

*Dendroica cerulea* CHERRIE, Auk, IX, 1892, 21 (San José; four specimens, Aug. 24 to Oct. 24).

*Dendræca cerulea* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 130 (Irazú [Rogers]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 327, 651 (no C. R. specimens).

*Dendroica rara* RIDGWAY, Auk, XIV, 1897, 97; Birds N. and Mid. Amer., II, 1902, 570 (eastern U. S., south in winter to Cuba and Grand Cayman and through eastern Mexico, Central America, and western South America (east of the Andes) to Peru and Bolivia).

Carnegie Museum: Carrillo, Sept. 2, 1905, one ♂ (Carriker).

This species appears to be very rare in Costa Rica. It has been taken in the Caribbean lowlands as well as in the plateau region. The bulk of the birds evidently pass on farther south, not stopping in Costa Rica.

616. *Dendroica virens* (Gmelin).

[*Motacilla*] *virens* GMELIN, Syst. Nat., I, pt. ii, 1788, 985 (based on *The Black-throated Green Warbler*, *Muscicapa viridis gutture nigro* EDWARDS, Gleanings Nat. Hist., II, 190, pl. 300, upper fig.).

*Dendroica virens* BAIRD, Rept. Pacific R. R. Surv., IX, 1858, 267. — FRANTZIUS, Jour. für Orn., 1869, 293 (Candelaria Mts.). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (Volcan de Irazú, Feb. 27 to March 6 [Nutting]). — CHERRIE, Auk, VII, 1890, 336 (San José, November [Alfarol]); VIII, 1891, 278 (San José; three skins in Mus. Nac.). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 562 (eastern North America, south in winter to West Indies, Mexico, and Central America to Isthmus of Panama).

*Dendræca virens* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Grecia and Barranca [F. Carmiol], Rancho Redondo [J. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 137 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 647 (Irazú district [Rogers]).

Bangs Collection: Volcan de Irazú, Dec. 9 to 18 and Jan. 14; Cerro de Santa Maria, Dec. 8 (Underwood).

Fleming Collection: San José, Oct. 16 (Underwood).

Carnegie Museum: Volcan de Irazú, Feb. 25 to April 14; Juan Viñas, April 17 (Carriker). Four skins.

A common migrant throughout the upper portion of the plateau region and the high mountains, ranging nearly up to timber-line on the volcanoes.

617. *Dendroica coronata* (Linnæus).

[*Motacilla*] *coronata* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 333 (based on *Golden-crowned Flycatcher*, *Muscicapa aureo vertice*, EDWARDS, Gleanings Nat. Hist., 187, pl. 298, fig. 1).

*Dendroica coronata* GRAY, List. Gen. Birds, App., 1842, 8. — FRANTZIUS, Jour. für Orn., 1869, 293 (Costa Rica). — CHERRIE, Auk, VII, 1890, 336 (San José; Jan. and Feb.); VIII, 1891, 278 (San José, two skins in Mus. Nac.). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 546 (North America in general, chiefly east and north of Rocky Mts., south in winter to West Indies, Mexico, and Central America to Isthmus of Panama).

*Dendræca coronata* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Angostura [F. Carmiol]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 127 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 311 (no C. R. specimens).

U. S. Nat. Museum: Guayábo, March 18 (Ridgway and Zeledón).

Fleming Collection: Carrillo, Oct. 2 (Underwood).

Carnegie Museum: Guácimo, Dec. 4 (Carriker). One male.

I think that this bird is a regular and fairly common winter visitor in the Caribbean lowlands, for I saw small flocks of them on numerous occasions in the vicinity of Guápiles, Jiménez, and El Hogar, in the winters of 1905-6 and 1906-7.

#### 618. *Dendroica bryanti castaneiceps* Ridgway.

*Dendræca vicilloti* SALVIN, Ibis, 1866, 192, *part* (Tempate, Gulf of Nicoya, Costa Rica [Arcé]); 1869, 313. — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Costa Rica; "Cabanis, J. f. O., 1860, 326"). — BOUCARD, P. Z. S., 1878, 52 (Puntarenas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1881, 125 (Tempate, Gulf of Nicoya [Arcé]).

*Dendræca bryanti* SHARPE, Cat. Birds Brit. Mus., X, 1885, 645, *part* (Tempate, Costa Rica).

*Dendroica bryanti castaneiceps* RIDGWAY, Proc. U. S. Nat. Mus., VIII, 1885, 350, footnote (La Paz, Lower Cal.; coll. U. S. Nat. Mus.). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (Puntarenas). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 530 (Pacific coast of Mexico and Central America from Lower California to Costa Rica).

*Dendroica vicilloti castaneiceps* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 525 (Puntarenas, C. R.; crit.); Expl. Zool. en C. R., 1891-2, 1893, 13 (Punta Mala, delta of Rio Grande de Térraba).

U. S. Nat. Museum: Pígres (Ridgway), Puntarenas (Alfaro and Cherrie).

Carnegie Museum: Puntarenas (Carriker).

This handsome species is confined to the mangroves bordering the salt and brackish estuaries of the Pacific coast. It is particularly common along the shores of the Gulf of Nicoya north of Puntarenas, and just opposite that town, on the mainland. It is also present along the delta of the Rio Grande de Térraba.



619. *Dendroica bryanti bryanti* (Ridgway).

*Dendroica vieillottii*, var. *bryanti* RIDGWAY, Amer. Nat., VII, 1873, 605 (Belize, Brit. Honduras; coll. U. S. Nat. Mus.).

[*Dendræca vieilloti*] Subsp. *a. Dendroica bryanti* SHARPE, Cat. Birds Brit. Mus., X, 1885, 284 (Nicaragua).

*Dendroica vieilloti bryanti* CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 521, 524 (Puerto Limon, Costa Rica; crit.).

[*Dendroica bryanti*] *a. bryanti* RIDGWAY, Proc. U. S. Nat. Mus., VIII, 1885, 350.

*Dendroica bryanti* SHARPE, Cat. Birds Brit. Mus., X, 1885, 645, *part.*

*Dendroica bryanti bryanti* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 529 (Gulf coast of Mexico and Caribbean coast of Central America from Tamaulipas to Costa Rica).

U. S. Nat. Museum: Port Limon, Uvita Island (Cherrie).

Bangs Collection: Limon (Underwood), two skins.

This form takes the place on the Caribbean coast which the preceding bird occupies on the Pacific, that is, it inhabits the mangroves and other salt-water growths along the beach. Frantzius records the bird from San José, saying that he saw one. This is without question an error, for the bird is confined to the sea-coast, and the bird which he saw could have been nothing else than *D. æstiva æstiva*.

620. *Dendroica petechia aureola* (Gould).

*Sylvicola aureola* GOULD, Zool. Voy. Beagle, III, Birds, 1841, 86, pl. 28 (Galapagos Archipelago).

*Dendroica aureola* CASSIN, Proc. Acad. Nat. Sci. Phila., 1860, 192. — TOWNSEND, Bull. Mus. Comp. Zool., XXVII, 1895, 122 (Cocos Island).

*Dendroica petechia aureola* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 521 (Galapagos Archipelago, Cocos Island, Gorgona Island, and various points on mainland).

"This bird is not distinguishable from the bird of the Galapagos. It is more closely related to *D. petechia* of Jamaica than to the mainland species." (Townsend.)

I do not know under what conditions the bird is found on Cocos Island, but its habits are probably similar to those of the Jamaican Yellow Warbler, *D. petechia petechia*.

621. *Dendroica æstiva æstiva* (Gmelin).

*Motacilla æstiva* GMELIN, Syst. Nat., I, pt. ii, 1788, 996 (based on *Figuier de Canada* Daubenton, Pl. Enl., pl. 58, fig. 2).

*Rhimamphus æstivus* CABANIS, Jour. für Orn., 1860, 326 (highlands of Costa Rica, Sept. [Hoffmann and Frantzius]).

*Dendroica æstiva* BAIRD, Rept. Pacific Railway Surv., IX, 1858, 282, *part*; Review Am. Birds, 1865, 197, *part* (San José [Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 293 (San José, August and Sept.; Candelaria, Nov.). — CHERRIE, Auk, VII, 1890, 335 (San José, Aug. 25 to May 9); VIII, 1891, 279 (San José, Aug. 24 to May 11); Expl. Zool. en C. R., 1891-2, 1893, 13 (Lagarto and Buenos Aires).

*Dendræca æstiva* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (San José [J. Carmioli]). — BOUCARD, P. Z. S., 1878, 52 (San José, Jan. and March). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 124, *part* (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 273, 644, *part* (no C. R. specimens). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 499 (San José [Nutting]). — UNDERWOOD, Ibis, 1896, 433 (Miravalles, common).

*Dendroica æstiva æstiva* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 508 (North America in general, except Alaska and northern Pacific coast, south in winter through eastern Mexico and Central America to Colombia, Ecuador, and northern Brazil).

*Chrysocantor æstiva æstiva* BANGS, Auk, XXIV, 1907, 306 (Boruca and El Pózo, April 10 to 27 [Underwood]).

U. S. Nat. Museum: Guayábo, Feb. 19 (Ridgway and Zeledón); Pígres, March 6 (Ridgway); Bonilla, April 9 (Ridgway); Santo Domingo de San Mateo, Feb. (Alfaro).

Bangs Collection: Coralillo, April 11; Bolson, Dec. 12 to 28; Tenorio, Jan. 23 (Underwood).

Fleming Collection: San José, Sept. 10; Bebedéro, Sept. 19 (Underwood).

Carnegie Museum: Guápiles, March 2 (Carriker & Crawford); Guácimo, Oct. 12; Cuábre, March 14; Rio Sicsola, Sept. 8, 24; El Hogar, Nov. 18 and Jan. 19 (Carriker); San José, Oct. 20 to Nov. 26 (Underwood). Twelve skins.

An abundant migrant over the whole of Costa Rica from sea-level up to at least 4,000 feet. It is not found in the forest, but in open woodland and shrubbery.

## 622. *Compsothlypis pitiayumi speciosa* Ridgway.

*Parula inornata* BAIRD, Review Amer. Birds, 1865, 171, *part* (Angostura and Dota, March and August, 1864 [F. Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 93 (Barranca and Dota [F. Carmioli], Angostura [J. Carmioli]). — SALVADORI, Atti. Roy. Ac. Torino, 1868, 172 (Costa Rica). — FRANTZIUS, Jour. für Orn., 1869, 292 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 120 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 643, *part* (Turrialba [Arcé]).

*Compsothlypis inornata* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (Naránjo de Cartago, Dota).

[*Parula pitiayumi*] subsp. *α. inornata* SHARPE, Cat. Birds Brit. Mus., X, 1885, 260, *part* (Costa Rica).

*Compsothlypis pitiayumi speciosa* RIDGWAY, Auk, XIX, 1902, 69 (Boquete, Chiriquí; coll. U. S. Nat. Mus.); Birds N. and Mid. Amer., II, 1902, 487 (Nicaragua to Chiriquí).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla, Santa Maria de Dota (Basulto), Juan Viñas (Cooper) (Underwood).

Bangs Collection: Carrillo and La Vijagua (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Carrillo (Underwood), Carrillo, La Hondura, Juan Viñas (Carriker). Six skins.

This handsome little warbler is found only on the Caribbean watershed, from about 1,000 up to 4,000 feet, with its zone of greatest abundance between 1,500 and 3,000 feet. It is found in the heavy forest as well as in scattering trees, seeming to prefer, however, the margins of the forest. Its habits are the same as those of the common Parula Warbler of the United States. I was never able to find its nest.

### 623. *Oreothlypis gutturalis* (Cabanis).

*Compsothlypis gutturalis* CABANIS, Jour. für Orn., 1869, 329 (Volcan de Irazú, Costa Rica [Frantzius]; coll. Berlin Mus.).

*Parula gutturalis* BAIRD, Review of Amer. Birds, 1865, 169 (Rancho Redondo [Carmioll]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 93 (Volcan de Irazú — BOUCARD, P. Z. S., 1878, 52 (Volcan de Irazú, 600 ft.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 123, pl. 8, fig. 3 (Costa Rican references). — RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 494 (Volcan de Irazú [Nutting]). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 263, 643 (no C. R. specimens).

*Oreothlypis gutturalis* RIDGWAY, Auk, I, 1884, 169; Proc. U. S. Nat. Mus., XIV, 1891, 473 (Achiote de Póas [Alfaro]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (Irazú). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 524 (Volcan de Póas [Cooper]). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 476 (high mountains of Chiriquí and Costa Rica: Volcan de Irazú and Rancho Redondo).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), El Copey, Las Vueltas, and La Lagunaria de Dota (Basulto), San Juan de Irazú (Ridgway), Achiote de Póas (Alfaro).

Bangs Collection: Irazú, Escazú, and Azahar de Cartago (Underwood).

C. H. Lankester Collection: Volcanoes de Irazú, Póas, and Turrialba.

Carnegie Museum: Volcan de Irazú and Ujurrás de Térraba (Carriker). Seven skins.

This beautiful warbler, so easily recognized by its flame-colored throat, is found on all the higher mountains of Costa Rica, wherever they rise

above 6,000 feet. It is abundant on the volcanoes at about 7,000 to 9,000 feet, as well as in the higher parts of the Dota Mountains and the Cordillera de Talamanca. It inhabits the heavy forest, flitting about among the branches of the trees, now low, now high, in the characteristic manner of a warbler. Its note is weak and not easily recognized.

624. ***Helminthophila peregrina*** (Wilson).

*Sylvia peregrina* WILSON, Am. Orn., IV, 1811, 83, pl. 25, fig. 2.

*Helminthophaga peregrina* CABANIS, Mus. Hein., I, 1850, 20; Jour. für Orn., 1861, 85 (Costa Rica [Frantzius]). — BAIRD, Review Am. Birds, 1865, 178 (San José [Carmioli]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (San José and Grecia [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 293 (San José, August). — BOUCARD, P. Z. S., 1878, 52 (San José). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 117 (Costa Rican references).

*Helminthophila peregrina* RIDGWAY, Bull. Nutt. Orn. Club, VII, 1882, 54; Birds N. and Mid. Amer., II, 1902, 460 (eastern North America, south in winter over southern U. S. to Cuba and Grand Cayman, and through eastern Mexico and Central America to Colombia and Venezuela). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 239, 689 (no C. R. specimens). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (San José and Cartago). — CHERRIE, Auk, VII, 1890, 335 (San José, first seen Sept. 17, common from Oct. 27 onward).

U. S. Nat. Museum: Guayábo, Mar. 30 (Ridgway and Zeledón); Pígres, March (Ridgway); Bonilla, April 8 to 13 (Basulto).

Bangs Collection: Bolson, Dec. 19 (Underwood).

C. H. Lankester Collection: Cachí.

Fleming Collection: Carrillo, Oct. 27; San José, Oct. 16 (Underwood).

Carnegie Museum: San José, Oct. 20; Juan Viñas, March 18 (Underwood); La Hondura, Oct. 8; El Hogar, Nov. 18 and Dec. 9; Peralta, Nov. 9 (Carriker). Ten skins.

An abundant winter visitor over nearly the whole of Costa Rica from sea-level up to 5,000 or 6,000 feet. Apparently as abundant at low altitudes as in the highlands.

625. ***Helminthophila chrysoptera*** (Linnæus).

[*Motacilla*] *chrysopiera* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 333 (based on *The Golden-winged Flycatcher*, *Muscicapa alis aureus* EDWARDS, Gleanings Nat. Hist., II, 189, pl. 299).

*Helminthophaga chrysoptera* CABANIS, Jour. für Orn., 1860, 328 (Costa Rica [Hoffmann]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Barranca [J. Carmioli]). — FRANTZIUS, Jour. für Orn., 1869, 293 (La Candelaria). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 114 (Costa Rican references). — UNDERWOOD, Ibis, 1896, 433 (Miravalles).

*Helminthophila chrysoptera* RIDGWAY, Bull. Nutt. Orn. Club., VII, 1882, 53; Birds N. and Mid. Amer., II, 1902, 448 (eastern U. S., south in winter to Cuba and through eastern Mexico and Central America to Colombia). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 235, 639 (no C. R. specimens). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (Jiménez). — CHERRIE, Auk, VII, 1890, 335 (San José, Sept. 15); VIII, 1891, 278 (San José, Oct. 2, a rare bird).

U. S. Nat. Museum: Guayábo, March 9 (Ridgway and Zeledón).

Fleming Collection: Carrillo, Oct. 31 (Underwood).

Carnegie Museum: Guápiles, March 30 (Carriker & Crawford); La Hondura, Dec. 21 (Underwood); Guácimo, Nov. 28; Guápiles, Jan. 22; La Hondura, Sept. 21; El Hogar, Nov. 14 (Carriker). Six skins.

A fairly common migrant in Costa Rica, but not so abundant as the preceding species. It seems to be more numerous on the lower Caribbean slope and quite rare on the central plateau, while on the Pacific slope it is entirely absent.

#### 626. *Protonotaria citrea* (Boddaert).

*Motacilla citrea* BODDAERT, Tabl. Pl. Enl., 1783, 44 (based on *Figuier a ventre et tete jaunes de la Louisiana* DAUBENTON, Pl. Enl., pl. 704, fig. 2).

*Protonotaria citrea* BAIRD, Rept. Pacific Railway Surv., IX, 1858, 239; Review Am. Birds, 1865, 173 (Puntarenas, Costa Rica, Capt. J. M. Dow). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (Puntarenas [J. M. Dow]). — FRANTZIUS, Jour. für Orn., 1869, 293 (Puntarenas). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 111 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 249, 641 (no C. R. specimens). — CHERRIE, Auk, VII, 1890, 335 (San José, Oct. 13; not seen in spring). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (San José). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 442 (more southern portions of the U. S., southward in winter to Cuba and through eastern Mexico and Central America to Colombia).

*Helminthophaga citrea* CABANIS, Jour. für Orn., 1861, 85 (Costa Rica [Frantz]).

Bangs Collection: Bolson, Dec. 15 (Underwood).

Fleming Collection: San José, Sept. 15 (Underwood).

A very rare winter visitor in Costa Rica. There are no records of its occurrence on the Caribbean slope, but several from the highlands of the interior and the Pacific coastal region.

#### 627. *Helmitheros vermivorus* (Gmelin).

[*Motacilla*] *vermivora* GMELIN, Syst. Nat., I, 1788, 951 (based on *The Worm-eater, Vermivora* EDWARDS, Gleanings Nat. Hist., II, 200, pl. 305).

[*Helmitheros*] *vermivora* BONAPARTE, Cons. Av., I, 1850, 314.

[*Helmitheros*] *vermivorus* CABANIS, Jour. für Orn., 1860, 328 (Costa Rica [Hoffmann]).

*Helmitherus vermivorus* BAIRD, Review Am. Birds, 1865, 180, San José [Carmiol]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 94 (San José [J. Carmiol]). — CHERRIE, Auk, VII, 1890, 335 (one skin in Mus. Nac.); VIII, 1891, 278 (San José, November 23, one ♂); Expl. Zool. en C. R., 1891-2, 1893, 13 (Lagarto, one specimen).

*Helmintherus vermivorus* FRANTZIUS, Jour. für Orn., 1869, 293 (Costa Rica).

*Helminthotherus vermivorus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 112 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 230, 638 (no C. R. specimens).

*Helmitheros vermivorus* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 439 (eastern United States, south in winter to the Bahamas, Cuba, Jamaica, and through eastern Mexico and Central America to Veragua).

Bangs Collection: Tenorio, Jan. 26 and Feb. 2 (Underwood).

Fleming Collection: Escazú, March 9 (Underwood).

Carnegie Museum: Azahar de Cartago, Nov. 19 (Underwood).

This is not a common migrant in lower Central America, only a small portion of the birds getting so far south as Costa Rica, in which country it seems to be confined to the highlands.

#### 628. *Mniotilta varia* (Linnæus).

[*Motacilla*] *varia* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 333 (based on *The Small Black and White Creeper* SLOANE, Nat. Hist. Jamaica, II, 309, pl. 265, fig. 1).

*Mniotilta varia* VIEILLOT, Dict. d'Hist. Nat. XXI, 1818, 230. — BAIRD, Review Amer. Birds, 1865, 168 (Puntarenas [J. M. Dow], Angostura [Carmiol]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 93 San José, Barránca and Tuís [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 292 (San José, San Juan, and Candelaria). — BOUCARD, P. Z. S., 1878, 52 (San Carlos, Feb.). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1880, 110 (Costa Rican references). — SHARPE, Cat. Birds Brit. Mus., X, 1885, 251, 641 (no C. R. specimens). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 106 (Tárcoles, San Mateo, Cartago). — CHERRIE, Auk, VII, 1890, 335 (San José, Aug. 20); VIII, 1891, 277 (do.); Expl. Zool. en C. R., 1891-2, 1893, 13 (Boruca). — UNDERWOOD, Ibis, 1896, 433 (Miravalles). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 432 (eastern North America, wintering from the Gulf States southward, throughout the West Indies, Mexico, and Central America to Colombia and Venezuela).

U. S. Nat. Museum: Guayábo, March 30 (Ridgway and Zeledón).

Bangs Collection: Cerro de Santa Maria, Jan. 8; Volcan de Irazú, Jan. 9; La Vijagua, Feb. 27 (Underwood).

Fleming Collection: Carrillo, Nov. 8 (Underwood).

C. H. Lankester Collection: Guácimo, Jan. 11.

Carnegie Museum: Juan Viñas,<sup>1</sup> March 21; Guácimo, Sept. 25; Carrillo, Sept. 1-2; La Honduras, Sept. 22; Ujurrás de Térraba, Sept. 14 (Carriker); San José, Oct. 20, Nov. 6 (Underwood). Ten skins.

This common warbler is found in winter in almost every part of Costa Rica, from near sea-level up to not less than 7,000 feet (Ujurrás de Térraba). It never appears to be numerous in individuals and is always seen alone.

Family CÆREBIDÆ.

629. **Cœreba mexicana** (Sclater).

*Certhiola mexicana* SCLATER, P. Z. S., 1856, 286 (S. Mexico, probably Cordova, Vera Cruz); Cat. Birds Brit. Mus., XI, 1886, 38, *part* (Turrialba [Arcé]). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Turrialba and Atenas [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 250, *part* (Costa Rican references). *Cœreba mexicana* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Naránjo de Cartago, Volcan de Barba). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 488 (Rio Frio). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 409 (southern Mexico, through Central America and Pacific coast of South America to Ecuador). — BANGS, Auk, XXIV, 1907, 308 (Boruca and Barránca de Térraba [Underwood]).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway) (Basulto).

Bangs Collection: Carrillo, El General de Térraba, Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, Guácimo, Guápiles, Carrillo, El Hogar, Boruca (Carriker). Thirteen skins.

As is generally the rule with species covering so wide a geographical range as the present, it is found in almost all parts of Costa Rica from sea-level up to 4,000 feet, and perhaps higher, on the Pacific as well as the Caribbean slope, but is not at all common in the region of Guanacaste or Nicoya. It does not associate in flocks so much as the other species of the family, being in this respect more like *Diglossa plumbea*, although often found in company with other species of honey-creepers, vireos, and small tanagers. It is seldom encountered in the heavy forest, preferring open woodland, low trees, and shrubbery.

630. **Dacnis venusta** Lawrence.

*Dacnis venusta* (not *Sylvia venusta* Descourtilz) LAWRENCE, Ann. Lyc. N. Y., VII, 1862, 464 (Panama); IX, 1868, 97 (Dota [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica). — SALVADORI, Atti. Roy. Ac. Torino, IV, 1868, 172 (Costa Rica). — BOUCARD, P. Z. S., 1878, 54 (La Candelaria). — RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 414 (Cervantes [J. Cooper]). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 245 (Tucurríqui [Arcé]). — SCLATER, Cat. Birds Brit. Mus., XI, 1886, 24 (Costa Rican ref-

erences). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Naránjo de Cartago, Birrís, Monte Redondo). — CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 529 (descr. young); Expl. Zool. en C. R., 1891-2, 1893, 17 (Boruca). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 396 (highlands of Costa Rica: Dota Mts., Tucurríqui, Turrialba, Naránjo de Cartago, Pózo Azul de Pirrís, Candelaria, etc., to Colombia). — BANGS, Auk, XXIV, 1907, 308 (Boruca [Underwood]).

U. S. Nat. Museum: Guayábo and Bonilla (Ridgway and Zeledón), Bonilla and La Lagunaria de Dota (Basulto), Juan Viñas, Monte Redondo, and Birrís (Mus. Nac. de C. R.).

Bangs Collection: Carrillo, Cachí, Juan Viñas, La Vijagua (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Carrillo (Carriker). Eight skins.

This handsome species has a wide range in Costa Rica, covering practically the whole of the country between the altitudes of 1,000 and 4,000 feet, on both the Caribbean and Pacific slopes. It seems to descend lower on the Pacific side, having been taken at Pózo Azul, which is only about 200 or 300 feet above sea-level, but on the eastern side the lowest record is from Carrillo, at about 1,200 feet. Its habits are the same as those of the other species of the family found in Costa Rica, the birds assembling in small flocks in open woodlands and among scattering trees, rather than in the heavy forest.

### 631. *Dacnis cayana callaina* Bangs.

*Dacnis ultramarina* (not of Lawrence, 1864) ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Trojas de Puntarenas). — CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 17 (Térraba).

[*Dacnis cayana*] *b.* Subsp. *typica* SCLATER, Cat. Birds Brit. Mus., XI, 1886, 19, *part* (no Costa Rican record).

*Dacnis cayana ultramarina* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 394, *part* (Isthmus of Panama to eastern Nicaragua).

*Dacnis cayana callaina* BANGS, Proc. Biol. Soc. Wash., XVIII, 1905, 154 (type from Divala, Chiriquí [W. W. Brown]; coll. E. A. and O. Bangs); XIX, 1906, 111 (Pózo Azul de Pirrís [Underwood]); Auk, XXIV, 1907, 308 (Boruca and Paso Real de Térraba [Underwood]).

Bangs Collection: El General de Térraba (Underwood).

Fleming Collection: Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Bóruca (Carriker). Seven skins.

This race of *Dacnis cayana* is perfectly good in every respect, being easily distinguished from *ultramarina* by the decidedly different shade of blue in the males. It is confined to the Pacific coast and lower foot-hills of southwestern Costa Rica, from the Rio Grande de Tárcoles southward,



thence into Chiriquí. It seems to be more abundant in Costa Rica, within its range, than is *D. c. ultramarina* on the eastern side. I found it very abundant all around Boruca in July, and later at Buenos Aires in August and September, feeding in flocks on a small berry-like fruit.

632. ***Dacnis cayana ultramarina*** (Lawrence).

*Dacnis ultramarina* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1864, 106 (Panama Railroad; coll. G. N. Lawrence); Ann. Lyc. N. Y., IX, 1868, 97 (Angostura [J. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica). — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 244, *part* (Costa Rican references).

[*Dacnis cayana*] *a.* Subsp. *ultramarina* SCLATER, Cat. Birds Brit. Mus., XI, 1886, 20, *part* (no Costa Rican record).

*Dacnis cayana ultramarina* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 394, *part* (Isthmus of Panama to eastern Nicaragua).

U. S. Nat. Museum: Bonilla (Zeledón) (Basulto).

Carnegie Museum: El Hogar (Carriker). Two males, three females.

This form of *Dacnis cayana* is confined in Costa Rica to the Caribbean lowlands and lower slopes, probably from about sea-level up to 2,000 feet. It seems to be a rare bird and not many records are extant for its occurrence in Costa Rica. It was taken by Carmiol at Angostura and by Zeledón and Basulto at Bonilla, but in addition to these, the five skins which I secured at El Hogar seem to be all of which I can find any record. My specimens were taken August 16, December 6, and January 1. On Dec. 6 there was quite a large flock of the birds in a low tree in a pasture near the house, but after securing three, they flew away and I could not find them again.

633. ***Cyanerpes lucidus isthmicus*** Bangs.

*Cæreba lucida* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 249, *part* (no Costa Rican record). — SCLATER, Cat. Birds Brit. Mus., XI, 1886, 35, *part* (no Costa Rican record).

*Arbelorhina lucida* (not *Cæreba lucida* Sclater and Salvin) ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (San José, Port Limon, Pózo Azul de Pirrís). — CHERRIE, Auk, IX, 1892, 23 (San José, transient visitor); Expl. Zool. en C. R., 1891-2, 1893, 17 (Boruca and Térraba).

*Cyanerpes lucidus* OBERHOLSER, Auk, XVI, 1899, 34, *part* (synonymy; range). — RIDGWAY, Birds N. and Mid. Amer., II, 1902, 389, *part* (Central America from Guatemala to the Isthmus of Panama).

*Cyanerpes lucidus isthmicus* BANGS, Auk, XXIV, 1907, 306 (Paso Real de Térraba and Boruca, type from Paso Real [C. F. Underwood]; coll. E. A. and O. Bangs).

U. S. Nat. Museum: Bonilla (Ridgway, Zeledón, Alfaro, Basulto), San José (Cherrie).

Bangs Collection: El General de Térraba, Pózo Azul de Pirrís, Cerro de Santa Maria, Carrillo, and vicinity of San José (Underwood).

(Underwood *in litt.*): Reventazón, Pacuarito, Jiménez, Limon.

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Pózo Azul de Pirrís, La Hondura, Carrillo, Guápiles (Carriker). Twenty skins.

Mr. Bangs has separated the Costa Rican birds from true *lucidus*, restricting that form to Guatemala, Honduras, and Salvador, and giving Nicaragua, Costa Rica, and Panama as the range of *isthmicus*, saying that northern Costa Rican specimens are inclined to be intermediate between the two forms, but nearer to *isthmicus*.

The subspecies seems to be a good one, being based not only on color, but on the smaller size and noticeably shorter bill of the southern birds. This bird has a wide range, which covers the lowlands and slopes of both coasts, extending up to and over a great deal of the central plateau. It reaches its greatest abundance on the lower slopes of either side at an elevation of from 1,000 to 2,000 feet, although it is taken at times in abundance at much higher elevations. Like *Euphonia* and *Tangara* it seems to make seasonal migrations of considerable extent, which explains its apparent abundance or scarcity at the same places at different seasons.

#### 634. *Cyanerpes cyaneus* (Linnæus).

*Certhia cyanea* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 188 (based on *Certhia nigrocæruleoque varia* EDWARDS, Nat. Hist., II, 114, pl. 264, fig. 1).

*Cæreba cyanea* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Costa Rica; authority of Cabanis).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 248 (Costa Rican references; Bebedéro [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 32 (Bebedéro [Arcé]).—UNDERWOOD, Ibis, 1896, 435 (Miravalles).

*Arbelorhina cyanea* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Las Trojas de Puntarenas, San José, Alajuela, Pózo Azul de Pirrís, and Monte Redondo).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893 (Lagarto, Boruca, Térraba, Buenos Aires).

*Cyanerpes cyaneus* OBERHOLSER, Auk, XVI, 1891, 32 (crit.).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 386 (continental tropical America in general from Mexico to southeastern Brazil; only east of the Andes).—BANGS, Auk, XXIV, 1907, 306 (Boruca, Paso Real, and Lagarto de Térraba [Underwood]).

U. S. Nat. Museum: Pígres (Ridgway), San José (Cherrie).

Bangs Collection: El General and Pózo Azul de Pirrís (Underwood).  
Carnegie Museum: Pózo Azul de Pirrís, Miravalles, El Hogar, Boruca (Carriker). Eleven skins.

This species is rare in Costa Rica on the Caribbean slope and lowlands, but very abundant over the whole extent of the Pacific region, from sea-level up to about 3,000 feet, some even going higher. The only record I have for the Caribbean lowlands is the two specimens which were collected at El Hogar. Like all the honey-creepers, this one is found in flocks, often associating with the preceding species, the habits of which are about the same.

635. *Chlorophanes spiza exsul* Berlepsch.

*Chlorophanes guatemalensis* (not of Sclater) SALVADORI, Atti. Ac. Roy. Torino, IV, 1868, 172 (Costa Rica).

*Chlorophanes spiza* var. *guatemalensis* (not of Sclater) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Tuís and Turrialba [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica).—BOUCARD, P. Z. S., 1878, 54 (Juan Viñas).

*Chlorophanes spiza guatemalensis* (not *Chlorophanes guatemalensis* Sclater) CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 17 (Boruca).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 383 (eastern Guatemala to Isthmus of Panama).—BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 111.

*Chlorophanes spiza* UNDERWOOD, Ibis, 1896, 435 (Miravalles).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 247, *part* (Costa Rican references).

[*Chlorophanes spiza*] *a.* Subspecies *guatemalensis* (not of Sclater, 1861) SCLATER, Cat. Birds Brit. Mus., XI, 1886, 30 (Turrialba [Arcé]).

*Chlorophanes spiza exsul* BERLEPSCH, P. Z. S., 1883, 543 (Chimbo, Ecuador; coll. Count von Berlepsch).—BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 111, *in text* (Costa Rica); Auk, XXIV, 1907, 306 (Boruca and Paso Real [Underwood]).

U. S. Nat. Museum: Guayábo (Basulto), Bonilla (Ridgway, Zeledón, and Alfaro).

Bangs Collection: Carrillo, Pózo Azul de Pirrís, La Vijagua, El General (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Pózo Azul de Pirrís, Carrillo (Carriker). Sixteen skins.

Although, as Mr. Bangs has said, Costa Rican specimens of *Chlorophanes spiza* are intermediate between *guatemalensis* and *exsul* (Proc. Biol. Soc. Wash., XIX, 1906, 111), it seems to me after a close comparison that they are nearer to the southern form, *exsul*, and should all be called that, although only the birds from the Térraba Valley are typical *exsul*. How-

ever, out of a very large series of birds examined from northern Costa Rica, I find none with the bill so large as the northern bird, typical *guatemalensis*, while about half of the males are as bluish as the Térraba birds, the others being greener, like the northern form.

This is a very abundant bird in many parts of Costa Rica, especially in the Rio Súcio gorge, around Carrillo and in the Térraba Valley. Its range may be said to cover the whole country from a little above sea-level up to 3,000 or 4,000 feet, but it is most numerous on either slope between 1,000 and 2,000 feet. It is found in flocks of considerable size when not breeding, and feeds on various kinds of small fruits and berries in addition to insects.

636. *Diglossa plumbea* Cabanis.

*Diglossa plumbea* CABANIS, Jour. für Orn., VIII, 1860, 411 (Volcan de Irazú ?, Costa Rica [Frantzius]; coll. Berlin Museum).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 97 (Quebrada Honda and San Juan de Irazú [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 297 (Volcan de Irazú; Las Cruces de Candelaria [Zeledón]).—BOUCARD, P. Z. S., 1878, 54 (Cartago, Juan Viñas, Volcan de Irazú, and La Laguna, 4,000 to 8,000 feet).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 9 (Irazú district [Rogers]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 243, pl. 15a, figs. 1 and 2 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 108 (Volcan de Irazú).—CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 529 (descr. of young).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 381 (highlands of Costa Rica and Chiriquí).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San Juan de Irazú (Ridgway and Alfaro), La Lagunaria, El Copey, Las Vueltas, and Santa Maria de Dota (Basulto).

Bangs Collection: Volcan de Irazú and Azahar de Cartago (Underwood).

C. H. Lankester Collection: Volcan de Póas.

Fleming Collection: Azahar de Cartago, Escazú, and La Palma de San José (Underwood).

Carnegie Museum: Volcan de Irazú, Volcan de Turrialba, and Ujurrás de Terraba (Carriker). Seven skins.

This curiously aberrant honey-creeper is found only at high altitudes, being only an occasional straggler below 6,000 feet, and is most abundant between 8,000 feet and timber-line on the high volcanoes. I usually saw them in pairs, and do not believe they are inclined to be so gregarious as the other species of the family. I found them rather low down in the forest or in the trees scattered about through the pastures on Irazú and Turrialba. A single male was seen and secured on the crest of the con-

tinental divide above Ujurrás de Térraba, at which point many of the high mountain forms were taken.

Family ICTERIDÆ.

637. **Dolichonyx oryzivorus** (Linnæus).

[*Fringilla*] *oryzivora* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 179 (based on *Avis arundinaceæ* EDWARDS, Gleanings Nat. Hist, 1758, pl. 291, smaller fig.).

*Dolichonyx oryzivorus* SWAINSON, Zool. Jour., III, 1827, 351.—SCLATER and SALVIN, P. Z. S., 1879, 509 (Costa Rica [Zeledón]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 331 (no Costa Rican specimens).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 448 (Costa Rican reference).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 370 (Atlantic coast of Central America during migration).

There are no specimens of the Bobolink in the United States, taken in Costa Rica, but Richmond took it in southeastern Nicaragua in 1892, while a specimen is recorded by Sclater and Salvin as having been taken in Costa Rica by Zeledón. The truth of the matter probably is, that the bird is a very rare and occasional winter visitor to Costa Rica, that country lying outside of the line of migration of the greater part of the birds, which pass to or through the West Indies into South America, and only a very few stragglers get down the Caribbean coast as far as Costa Rica.

638. **Sturnella magna alticola** Nelson.

*Sturnella ludoviciana* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (San José [J. Carmiol]).—BOUCARD, P. Z. S., 1878, 59 (Cartago).

*Sturnella mexicana* ZELEDÓN, Cat. Aves de C. R., 1882, 10 (Costa Rica).

*Sturnella magna mexicana* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (San José, Cartago, Alajuéla, and Santa Ana).—CHERRIE, Auk, VII, 1890, 334 (San José).

[*Sturnella magna*] *c.* Subsp. *mexicana* SCLATER, Cat. Birds Brit. Mus., XI, 1886, 360, *part* (San José [Calléja], Volcan de Irazú [Arcé and Rogers]).

*Sturnella magna* UNDERWOOD, Ibis, 1896, 437 (Miravalles).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 456, *part* (Costa Rican references).

*Sturnella magna inexpectata* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 364, *part* (Atlantic lowlands of southeastern Mexico, southward through eastern Guatemala, Nicaragua, Costa Rica, and Veragua).

*Sturnella magna alticola* NELSON, Auk, XVII, 1900, 266 (Ocuilapa, Chiapas, Mexico, Aug. 21, 1895 [Nelson and Goldman]; coll. Biological Survey).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway), Alajuéla (Alfaro).

Bangs Collection: Carrillo, Cerro de Santa Maria, Escazú, San Pedro, San José (Underwood).

C. H. Lankester Collection: La Palma, Ochomogo, Cachí, Las Concovas. Carnegie Museum: Volcan de Irazú, La Hondura, Miravalles, Bagáces, Juan Viñas (Carriker). Seven skins.

In attempting to identify Costa Rican specimens of *Sturnella magna*, we found them to be much larger than the measurements given by Mr. Ridgway for his *inexpectata*. Upon comparison of a series of Costa Rican birds with a series of *S. m. alticola* from Mexico, they were found to be exactly the same, being characterized by the large size and by the yellow malar streak.

*S. m. inexpectata* is a lowland form, running down the Caribbean lowlands, probably to some point in Nicaragua, but not reaching Costa Rica, in which country *Sturnella* is not found on the eastern slope lower than 2,000 feet, the birds being restricted to the upper eastern slope, the central highlands and mountains, up to 8,000 feet, and the northwestern Pacific slope and lowlands (Guanacaste).

*S. m. alticola* is a bird of the highlands, ranging from the highlands of Chiapas, Mexico, southward through Guatemala (Honduras and Nicaragua ?), Costa Rica, and Chiriquí.

It is a common bird in many parts of Costa Rica, wherever there are pastures. It is especially abundant around La Laguna de Corís, or Las Concovas, Laguna de Ochomogo, and in the vicinity of Turrúcares, and many are killed by sportsmen.

### 639. *Agelaius phæniceus sonoriensis* Ridgway.

*Agelaius phæniceus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 ("Gulf of Nicoya"; coll. O. Salvin).—? RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 496 (Rio Frio).

*Agelaius phæniceus* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 392 (La Palma de Nicoya).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 340, *part* (Bebedéro [Arcé]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 453, *part* (Costa Rican references).

*Agelaius phæniceus richmondi* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 335 (Rio Frio, Costa Rica).

C. H. Lankester Collection: Guanacaste.

Carnegie Museum: Bebedéro (Carriker). Seven males.

Unfortunately no females of this species were collected, so that their correct identification is almost impossible. The males are intermediate in size between *A. p. sonoriensis* and *richmondi*, and Messrs. Todd and Oberholser in comparing the birds in Washington thought they might be a new form, intermediate between the two above mentioned. There seems

little room for another subspecies, and without females it is better to refer them to *sonoriensis*, at least provisionally.

640. *Icterus galbula* (Linnæus).

*Coracias galbula* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 108 ("America"; based on *Icterus ex aureo nigroque varius* CATESBY, Nat. Hist. Carolina, I, pl. 48).

*Icterus galbula* COUES, Bull. Nutt. Orn. Club, V, 1880, 98.—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 490 (San José, Costa Rica [Nutting]; abundant in winter).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (San José, Alajuela, Cartago).—CHERRIE, Auk, VII, 1890, 334 (San José, Oct. 22 to March 2); IX, 1892, 250 (San José, rarer than *I. spurius*); Expl. Zool. en C. R., 1891-2, 1893, 30 (Buenos Aires, one specimen).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 310 (eastern North America, south in winter through Mexico and Central America to Colombia).

*Icterus baltimore* BOUCARD, P. Z. S., 1878, 59 (San José, March and April).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 364 (Irazú district [Rogers], Bebedéro [Arcé]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 461 (Costa Rican references).—UNDERWOOD, Ibis, 1896, 437 (Bebedéro to Miravalles, common).

*Hyphantes baltimore* CABANIS, Jour. für Orn., 1861, 8 (Costa Rica [Ellendorf, Hoffmann, and Frantzius]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (San José [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 303 (Costa Rica).

U. S. Nat. Museum: Bonilla, April, 1908 (Basulto); Pígres, March 6, 1905 (Lizano).

Bangs Collection: San José, December; Cerro de Santa Maria and Tenorio, January (Underwood).

Carnegie Museum: Guápiles, March 6-10 (Carriker & Crawford); Cuábre, Feb. 29; La Hondura, Sept. 20, 25; El Hogar, Dec. 6, 14 (Carriker). Seven skins.

The Baltimore Oriole is, I think, more abundant in Costa Rica in winter than the Orchard Oriole, although it may be that it is less common on the Pacific slope than that bird. However, on the Caribbean slope and lowlands, the Baltimore Oriole is in much greater numbers, and is always to be found in the trees about the plantation buildings. The birds are very fond of oranges and do considerable damage to the ripened fruit by pecking holes in them, through which they eat the inside.

641. *Icterus mesomelas salvini* (Cassin).

*Icterus mesomelas* (not *Psarocolius mesomelas* Wagler) SCLATER, Cat. Birds Brit. Mus., XI, 1886, 378, *part* (Valsa, Costa Rica [Carmiol]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Sipurio de Talamanca).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 470 (Costa Rican references).

*Icterus salvinii* CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 51 (Turrialba and San Carlos [J. Carmiol]; type in Acad. Nat. Sci. Phila.).

*Icterus salvini* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (Turrialba and San Carlos [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 302 (Costa Rica).

*Icterus mesomelas salvini* BANGS, Proc. New Eng. Zool. Club, II, 1900, 33 (Panama).

*Icterus mesomelas salvinii* RIDGWAY, Proc. Wash. Acad. of Sci., III, 1901, 153, *in text*; Birds N. and Mid. Amer., II, 1902, 307 (Nicaragua to Colombia and Venezuela).

U. S. Nat. Museum: Jiménez (Alfaro).

Bangs Collection: Limon (Underwood).

C. H. Lankester Collection: Banana River and Zeut.

Carnegie Museum: Guápiles (Carriker & Crawford), Guácimo, Cuábre, Rio Sicsola, El Hogar (Carriker). Nine skins.

This handsome species is confined to the Caribbean lowlands and lower foot-hills, having the same range as *I. prosthemelas*, except that it is not found at so high an altitude, seldom going above 1,000 feet. It is more abundant in southeastern Costa Rica than in the northern part, especially along the Sicsola River, where it frequents the wild cane and jungle of wild plantains so common there.

#### 642. *Icterus sclateri* Cassin.

*Icterus sclateri* CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 49 (San Juan and Pres Granada, Nicaragua; coll. Acad. Nat. Sci. Phila.).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 385 (no Costa Rican specimens).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 476, pl. XXXIII, fig. 1 (no Costa Rican references).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 297 (southern Mexico to western Costa Rica: Liberia?).—BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 111 (Miravalles, two ♂'s [Underwood]).

*Icterus pustulatus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Liberia).—UNDERWOOD, Ibis, 1896, 437, *in text* (Bebedéro and Bagáces).

Bangs Collection: Miravalles and Bagáces (Underwood).

(Underwood *in litt.*): Mojica and Liberia.

Carnegie Museum: Bebedéro and Ciruélas (Carriker). Four skins.

Like the following species, this form is also confined to northwestern Costa Rica, being found only in the Nicoya peninsula and Guanacaste, and more abundantly in the low valley of the Tempisque River. It was first recorded from Costa Rica by Zeledón (An. Mus. Nac. de C. R., I, 1887, 112) under the name of *Icterus pustulatus*, it having been mistaken for that bird. It is not so common as *I. pectoralis espinachi*, but is found with that bird in the same kind of localities.



643. *Icterus pectoralis espinachi* Ridgway.

*Icterus pectoralis* (not *Psarocolius pectoralis* Wagler) CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 48 (Costa Rica).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (Costa Rica [Hoffmann], "Cabanis").—FRANTZIUS, Jour. für Orn., 1869, 302 (Costa Rica).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 385, *part* (no Costa Rican specimens).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 474, *part* (Costa Rican references).—UNDERWOOD, Ibis, 1896, 437 (Bagáces).

[*Icterus*] *pectoralis* SCLATER and SALVIN, Nom. Av. Neotr., 1873, 36, *part* (Costa Rica),

*Icterus guttulatus* CABANIS, Jour. für Orn., 1861, 9, (Costa Rica [Hoffmann]).

*Icterus pectoralis espinachi* "Nutting MS." RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 392 (La Palma de Nicoya, Sept. 5, 1882 [Nutting]; coll. U. S. Nat. Mus.).—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 392 (La Palma de Nicoya; song).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Liberia).

Bangs Collection: Bolson, Tenorio, and Bebedéro (Underwood).

Carnegie Museum: Bebedéro (Carriker). Six skins.

This handsome species is confined to the northwestern part of Costa Rica, and thus far has been taken only in the peninsula of Nicoya and to the northward, throughout the plains of Guanacaste. It is usually found in the swampy pastures, having habits similar to *I. prosthemelas* and *I. mesomelas salvini*, frequenting the clumps of trees dotted about in the pastures.

644. *Icterus spurius* (Linnæus).

[*Oriolus*] *spurius* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 162 (based on *Icterus minor* Catesby, Carolina, I, 49; *Icterus minor spurius* BRISSON).

*Icterus spurius* TEMMINCK, Cat. Syst., 1807, 47.—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 366 (Irazú district [Rogers]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Alajuela and Cartago).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 464 (Costa Rican references).—CHERRIE, Auk, VII, 1890, 334 (San José, July 31 to March 2); IX, 1892, 250 (San José; birds in young plumage predominate); Expl. Zool. en C. R., 1891-2, 1893, 30 (Buenos Aires, three specimens).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 275 (breeding over the whole of the eastern half of the U. S., south in winter over the whole of Mexico and Central America to Colombia).—BANGS, Auk, XXIV, 1907, 308 (El Pózo de Térraba, Aug. 10, one ♂ [Underwood]).

*Xanthornus spurius* CABANIS, Jour. für Orn., 1861, 8 (Costa Rica [Frantzius]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (San José [Frantzius and Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 303 (Costa Rica, seldom seen).

U. S. Nat. Museum: Pígres, March 4-8, 1905, 2 ♂-♀ (Ridgway and Zeledón).

Bangs Collection: San José, Sept. 27, Oct. 7 and 14; El Pózo de Térraba, Aug. 10 (Underwood).

Carnegie Museum: Guácimo, Nov. 14; Buenos Aires, Aug. 23 and Sept. 4 (Carriker); San José, Oct. 14, 2 ♀-♂ (Underwood). Six skins.

A fairly common winter resident, though not so abundant as many other species. It is much more common in the central highlands and on the Pacific slope than in the Caribbean lowlands and lower slopes. Adult males are rarely seen, but usually immature specimens, many moulting into the second year plumage, having the general color of the adult female, with patches of chestnut appearing on the throat and breast.

645. *Icterus prosthemelas* (Strickland).

*Xanthornus prosthemelas* STRICKLAND, Jardine's Contr. Orn., 1850, 120, pl. 62 (Guatemala; coll. H. Strickland).

*Icterus prosthemelas* SCLATER, P. Z. S., 1856, 301 (Cordova, Mexico); Cat. Birds Brit. Mus., XI, 1886, 373 (Peje [Carmioli], Tucurríqui [Arcé]).—BOUCARD, P. Z. S., 1878, 59 (Juan Viñas).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Jiménez and Naránjo de Cartago).—SALVIN and GODMAN, Biol. Centr.-Am., Aves., I, 1887, 466 (Costa Rican references).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 269 (southeastern Mexico, through Central America to Isthmus of Panama).

*Pendulinus prosthemelas* CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 56 (monogr.; Costa Rica).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (Tucurríqui ["Arcé; coll. O. Salvin"]).—FRANTZIUS, Jour. für Orn., 1869, 302 (Costa Rica).

U. S. Nat. Museum: Talamanca (Cherrie), Juan Viñas (Cooper).

Bangs Collection: San Carlos (Underwood).

(Underwood *in litt.*): Jiménez, Birris, Pacuarito.

C. H. Lankester Collection: Cachí, Cariblanco de Sarapiquí, and Guácimo.

Carnegie Museum: Guácimo and Guápiles (Carriker & Crawford), El Hogar (Carriker). Four skins.

There is a tendency in birds of this species from Costa Rica and Panama towards an extension of the black on the lower parts, that color extending in some specimens over the whole breast, only stopping at the abdomen. This, however, is not constant, some birds from Panama having just as small an amount of black as specimens from British Honduras.

The species is confined strictly to the Caribbean lowlands and slope (in Costa Rica), from near sea-level up to at 3,000 feet. It is most abundant in the Santa Clara Valley, where the extensive pastures and banana-plantations form the most suitable conditions for its increase. The birds are never seen at any great distance from a stream, and are partial to the large-leaved water plants growing in the shallows, where they doubtless build their nests. A nest I found was sewed to the under side of a banana-leaf, but it contained no eggs at the time.

646. *Megaquiscalus major macrourus* (Swainson).

*Quiscalus major* VIEILLOT, Nouv. Dict. d'Hist. Nat., XXVIII, 1819, 487, *part* (Mexico).

*Quiscalus macrourus* SWAINSON, Anim. in Menag., 1838, 299 (Real del Monte, Hidalgo, Mexico).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (Costa Rica).  
—FRANTZIUS, Jour. für Orn., 1869, 303 (Costa Rica).

*Chalcophanes macrourus* CABANIS, Jour. für Orn., 1861, 82 (Lepanto, Costa Rica [Ellendorf]).

*Quiscalus macrurus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (Costa Rica).  
—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 396 (no record south of Honduras).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Puntarenas and Tárcoles).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1887, 482 (Costa Rican references).

*Quiscalus major*, var. *macrurus* BAIRD, BREWER, and RIDGWAY, Hist. N. Am. Birds, II, 1874, 214.

*Megaquiscalus major macrourus* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 238 (southern Texas, southward through Mexico and Central America to Colombia).

U. S. Nat. Museum: Pígres (Ridgway and Zeledón).

C. H. Lankester Collection: Palo Verde.

(Underwood *in litt.*): Puntarenas and Las Trojas.

Carnegie Museum: Bebedéro and El Coronado de Térraba (Carriker).

Six skins.

The Great-tailed Grackle is not an uncommon bird along the Pacific coast of Costa Rica, but is found in no other part of the country, so far as is now known. It is very fond of the mangroves along the brackish estuaries so abundant in that region. The natives are very fond of its song, and call the bird "Zanate."

647. *Tangavius æneus involucratus* (Lesson).

*Molothrus æneus* CABANIS, Jour. für Orn., 1861, 81 (San José, Costa Rica [Ellendorf]).—CASSIN, Proc. Acad. Nat. Sci. Phila., 1866, 18, *part* (Costa Rica).  
—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (San José [Frantzius]).—BOUCARD, P. Z. S., 1878, 59 (San José, common).—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 392 (La Palma de Nicoya).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 334 (Orósi [Kramer]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 451, *part* (Costa Rican references).

*M[olothrus] robustus* CABANIS, Mus. Hein., I, 1851, 193, footnote (Mexico; coll. Berlin Mus.); Jour. für Orn., 1861, 81 (Costa Rica).

*Callothrús robustus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (San José, Cartago, Naránjo de Cartago, Alajuela).—CHERRIE, Auk, IX, 1892, 26 (San José; notes on nesting); IX, 1892, 250 (do).

*Tangavius involucratus* LESSON, Rev. Zool., II, 1839, 41 (*cf.* NELSON, Proc. Biol. Soc. Wash., XVIII, 1905, 125).

*Tangavius æneus involucratus* FOURTEENTH SUPPL. A. O. U. CHECK-LIST, Auk, XXV, 1908, 377.

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway and Alfaro).

Bangs Collection: San José (Underwood).

(Underwood in *litt.*): Cartago and Alajuéla.

Carnegie Museum: Bebedéro and Juan Viñas (Carriker). Two skins.

The Red-eyed Cowbird is fairly common in many parts of Costa Rica, being found over the entire highlands, wherever the land has been cleared and is under cultivation, or in pasture, as well as on the Caribbean slope down to 1,200 or 1,500 feet, and the whole of the northern Pacific slope and lowlands. It appears to be absent in the southwestern part of the country, south of the Rio Grande de Tárcos, but is abundant in Nicoya and Guanacaste. Its habits are too well known to deserve further mention.

648. ***Cassidix oryzivora mexicana*** (Lesson).

*Cassidix oryzivora* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Costa Rica).

—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 329, *part* (no C. R. specimens or records).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 444, *part* (no Costa Rican record).

*Cassidix oryzivora violæa* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 197, *part* (Costa Rica?; Nicaragua?).

(Underwood in *litt.*): Reventazón.

Carnegie Museum: Guápiles, March 20, 1903, ♂ (Carriker & Crawford).

This is the rarest of the family *Icteridæ* in Costa Rica. The only specimen I have seen of it from Costa Rica is the male collected at Guápiles by Mr. Crawford and myself. Underwood says that he took it at Reventazón (La Junta), but I do not know where the specimen is, unless at the Tring Museum. In Mr. Ridgway's "Birds of North and Middle America," he places Costa Rica and Nicaragua under the range of *C. c. violæa* Bangs, with a question, not having seen material from either country. The single bird from Guápiles, Costa Rica, is not *violæa* but typical *mexicana*. Of course this bird was taken in the extreme northeastern part of Costa Rica, in a region where we would expect to take the northern race rather than the southern, and it may be that, should the bird be found in southern Costa Rica, it would prove to be *violæa*.

The bird collected was taken in an isolated tree in a large pasture, was quite alone, and no others were seen in the vicinity before or afterwards.

649. *Amblycercus holosericeus* (Lichtenstein).

*Sturnus holosericeus* LICHTENSTEIN, Preis-Verz. Mex. Vög., 1831, 1 (Mexico); Jour. für Orn., 1863, 55 (reprint).

*Amblycercus holosericeus* SCLATER, Cat. Birds Brit. Mus., XI, 1886, 327 (Volcan de Irazú [Rogers]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 446 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Pózo Azul de Pirris, Las Trojas, Alajuéla, Jiménez).—CHERRIE, Auk, IX, 1892, 249 (San José); Expl. Zool. en C. R., 1891-2, 1893, 30 (Palmár, Boruca, Buenos Aires).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 194 (southeastern Mexico through Central America to Venezuela and western Ecuador).—BANGS, Auk, XXIV, 1907, 308 (Boruca and El Pózo de Térraba [Underwood]).

*Amblycercus prevosti* CABANIS, Jour. für Orn., 1861, 10 (Costa Rica [Frantzius]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (San José [J. Carmiol], Turrialba [F. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 302 (San José, Tucuríqui, Turrialba).

*Amblycercus prevostii* CASSIN, Proc. Acad. Nat. Sci. Phila., 1867, 75 (monogr.; Costa Rica [Carmiol]).

*Cassicus prevosti* BOUCARD, P. Z. S., 1878, 58 (San José).

U. S. Nat. Museum: Pígres (Ridgway), Bonilla (Zeledón and Alfaro), San Sebastian de San José and Jiménez (Alfaro), La Concepcion de Jiménez (Cherrie), Alajuéla (Alfaro).

Bangs Collection: Aguacate Mts., Coralillo, Pózo Azul de Pirris, El General (Underwood).

Carnegie Museum: Volcan de Irazú (8,000 feet), Cuábres, Rio Sicsola, Guácimo, La Hondura, El Hogar, Juan Viñas, El Pózo de Térraba, Boruca (Carriker). Fifteen skins.

(Underwood *in litt.*): Achióte de Póas, Las Trojas, Alajuéla, etc.

This is one of the most widely distributed birds of Costa Rica, being found at greater extremes of altitude than almost any other bird, except some of the swifts. I have taken it from sea-level on both coasts up to 8,000 feet on the Volcan de Irazú, and while collecting on the Volcan de Turrialba, I saw a pair just below timber-line in the bamboos. It is found in the thickest jungle of the lowlands, in patches of wild-cane, in the rank growths of "gamalote" grass along the river banks, in thickets, in pastures, in second-growth woodland, in fact in almost every conceivable kind of cover. I have invariably seen the birds in pairs, always near the ground, and when disturbed they attempt to skulk off through the undergrowth. They are found in such a variety of conditions that they would be a nuisance to the collector were it not for their pale pea-green bill, which is always very conspicuous, identifying them at a glance.

650. **Cacicus microrhynchus** (Sclater and Salvin).

*Cassiculus microrhynchus* SCLATER and SALVIN, P. Z. S., 1864, 353 (Lion Hill, Panama; coll. P. L. Sclater).

*Cassicus microrhynchus* FRANTZIUS, Jour. für Orn., 1869, 303 (Tucurríqui [Zeledón]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Pózo Azul de Pirrís and Pacuare).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 325 (Péje [Carmioli]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 442 (Costa Rican references).—CHERRIE, Expl. en el Rio Naránjo, 1893, 15; Expl. Zool. en C. R., 1891-2, 1893, 30 (Lagarto).—RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 495 (Rio Frio).

*Cacicus microrhynchus* SALVIN, P. Z. S., 1867, 142 (Veragua); Ibis, 1869, 319 (Péje, Costa Rica).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 189 (Nicaragua, Costa Rica, Panama, and northern Colombia).—BANGS, Auk, XXIV, 1907, 308 (El Pózo and Lagarto de Terraba [Underwood]).

U. S. Nat. Museum: Bonilla (Ridgway) (Basulto), Jiménez (Verrill), Pózo Azul de Pirrís (Underwood).

Bangs Collection: La Vijagua, Cariblanco de Sarapiquí, Limón, Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), Pózo Azul de Pirrís, Carrillo, Rio Sicsola, Cuábne, Guácimo, El Hogar (Carriker). Fourteen skins.

(Underwood *in litt.*): Pózo Pital, San Carlos, Reventazón.

This cacique is found only in the lowlands and foothills, but is equally common on both the Caribbean and the Pacific slopes, from sea-level up to not more than 1,500 feet, with perhaps a few straggling higher. They are usually found in the forest, although at times frequenting scattered trees in pastures, the edges of the forest and banana plantations. They have a weak, rather musical note, which is often uttered as the birds, in small bands, are feeding or flying about among the trees. I have never seen the nest.

651. **Gymnostinops montezuma** (Lesson).

*Cacicus montezuma* LESSON, Cent. Zool., 1830, 33, pl. 7 (Mexico).

*Ostinops montezumæ* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (San Carlos and Angostura [J. Carmioli]).—FRANTZIUS, Jour. für Orn., 1869, 302 (San Carlos, Sarapiquí, Angostura, Tucurríqui).—BOUCARD, P. Z. S., 1878, 58 (San Carlos and Juan Viñas).

*Gymnostinops montezumæ* SCLATER, Cat. Birds Brit. Mus., XI, 1886, 313 (Costa Rica [Carmioli]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 437 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Jiménez and Cartago).—UNDERWOOD, Ibis, 1896, 437 (Miravalles).

*Gymnostinops montezuma* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 180 (southern Mexico to Isthmus of Panama).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Turrialba (Ridgway).

Bangs Collection: Jiménez, Carrillo, Miravalles (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), La Hondura (Carriker). Four skins.

This species is most abundant in the lowlands of the Caribbean, being regularly found from sea-level up to 2,000 feet, and stragglers and small colonies as high as 4,000 feet. It is found also in the Pacific lowlands up to at least 2,000 feet. Its habits, habitat, and manner of nesting are practically the same as for the succeeding species, except that the nest is shorter and thicker than in *Zarhynchus*.

652. *Zarhynchus wagleri wagleri* (Gray).

*Cacicus wagleri* GRAY, Gen. Birds, II, 1847, 342 (no locality given for type), pl. 84.

*Ocyalus wagleri* CABANIS, Jour. für Orn., 1861, 9 (Costa Rica).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (San José, Turrialba, and San Carlos [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 302 (Costa Rica).—BOUCARD, P. Z. S., 1878, 58 (Orósi, Juan Viñas, and San Carlos).—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 393 (between San José and Puntarenas).

*Eucorystes wagleri* SCLATER, Ibis, 1883, 147, *part* (monogr.; Costa Rica); Cat. Birds Brit. Mus., XI, 1886, 312, *part* (Tucurríqui [Arcé]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 436, *part* (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Alajuela and Cartago).—CHERRIE, Auk, IX, 1892, 249 (San José; descr. of young).—RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 493 (Rio Frio).

*Zarhynchus wagleri* OBERHOLSER, Proc. Acad. Nat. Sci. Phila., 1899, 215.

*Zarhynchus wagleri wagleri* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 176 (Nicaragua to western Ecuador).

U. S. Nat. Museum: San José and Bonilla (Ridgway and Zeledón), Guayábo and Santo Domingo de San Mateo (Ridgway), Turrialba (Zeledón).

Bangs Collection: Monte Redondo, Carrillo, Juan Viñas (Underwood).

Carnegie Museum: Pózo Azul de Pirrís and Juan Viñas (Carriker). Four skins.

(Underwood *in litt.*): Tres Rios, Tambór, Pacuarito, San Bernardo.

This oropendola is confined to the highlands, and is found on both the Caribbean and Pacific slopes from about 2,000 feet upwards to 4,000 feet. They are found lower on the Pacific slope than on the Caribbean, and even on the eastern side occasionally straggle down to about 1,000 feet. They are found in the forest as well as in the cultivated regions where trees are

scattering, and are always seen in and about the coffee plantations. The birds make a great variety of peculiar noises, which are not only vocal, but produced by the remiges and rectrices in flying. Their manner of nesting is almost too well known to mention here, but I will give a brief description of their nests and eggs. The birds congregate together in colonies of varying size, from six or eight to as many as one hundred pairs building their nests in one large tree. The nests are long, purse-shaped structures, woven from the fibres of the common "Spanish Moss," with the entrance at the top, and are often as much as five feet in length and six or seven inches in diameter at the bottom. Two eggs seem to be the usual complement, and are deposited from about the 10th to the 15th of March. The eggs are pale blue, sparsely spotted and streaked with blackish.

Family TANGARIDÆ.

653. *Mitrospingus cassini* (Lawrence).

*Tachyphonus cassini* LAWRENCE, Ann. Lyc. N. Y., VII, 1861, 297 (Lion Hill, Panama; coll. G. N. Lawrence); IX, 1868, 101 (Angostura, Costa Rica [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).

*Eucometis cassinii* SCLATER and SALVIN, P. Z. S., 1864, 351, pl. 30 (Panama).

*Eucometis cassini* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 307 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 219 (Costa Rica [Carmiol]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Costa Rica).—RIDGWAY, Proc. U. S. Nat. Mus., XIV, 1891, 473 (Jiménez [Alfaro]; descr. of young).

*Mitrospingus cassini* BANGS, Proc. New Eng. Zool. Club, II, 1900, 29 (Loma del Leon, Panama).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 168 (Costa Rica (Angostura and Jiménez) southward through western Colombia to western Ecuador).

U. S. Nat. Museum: Guayábo, one ♀ (Ridgway and Zeledón), Jiménez (Alfaro).

Bangs Collection: Carrillo (Underwood).

C. H. Lankester Collection: Guácimo and Tuís.

Carnegie Museum: Guápiles (Carriker & Crawford), Guácimo, Carrillo, El Hogar, Bonilla (Carriker). Fourteen skins.

This peculiar tanager is confined to the Caribbean lowlands and foot-hills, from near sea-level up to about 1,500 or 2,000 feet, but is most abundant at about 600 to 800 feet, where the foot-hills end and the coastal plain begins. They are found only in the heavy forest, and are very partial to low swampy places and the thick underbrush along the margins of small streams running through the forest. Their habits are very similar



to those of *Tachyphonus delattrii*, in that they associate in flocks of six to twelve or more, and keep moving rapidly about in the undergrowth in wet swampy places. They are also very noisy, have a rather harsh note, and are shy and suspicious, flitting away precipitately when they discover an intruder.

654. ***Chlorospingus zeledoni* Ridgway.**

*Chlorospingus zeledoni* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 211 (type, adult male, Volcan de Irazú, May 20, 1905 [R. Ridgway]; coll. U. S. Nat. Mus.).—BANGS, Proc. New Eng. Zool. Club, III, 1908, 34 (Volcan de Irazú [Underwood]).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), eight skins.

Bangs Collection: Volcan de Irazú, large series; Volcan de Turrialba, one skin.

Carnegie Museum: Volcanoes de Irazú and Turrialba (Carriker). Three skins.

It is very unusual that two such closely related species as *C. pileatus* and *C. zeledoni* should occupy identically the same range and one remain undiscovered for so long a period. To all appearances the birds are decidedly distinct, with no signs of intergradation whatever. Whether or not it is a case of the same bird having two color phases cannot be determined without a positive knowledge of their breeding, which would be very difficult to obtain.

655. ***Chlorospingus pileatus* Salvin.**

*Chlorospingus pileatus* SALVIN, P. Z. S., 1864, 581 (Volcan de Irazú, Costa Rica; coll. Salvin and Godman).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 101 (Póas [J. Carmiol], Rancho Redondo [F. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 316, pl. 22, fig. 2 (Volcan de Irazú [Rogers]).—RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 412 (Birris [J. Cooper]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 241 (Volcan de Irazú [Arcé and Rogers]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Costa Rica).—CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 531 (Volcan de Póas [Alfaro]; descr. of young).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 165 (highlands of Chiriquí and Costa Rica: Volcan de Irazú, Volcan de Póas, Rancho Redondo, Birris).

U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San Juan de Irazú (Ridgway and Alfaro), Las Vueltas de Dota (Basulto), La Estrella de Cartago, Burgos de Irazú (Castro), Achióte de Póas (Alfaro), Volcan de Barba (Underwood).

Bangs Collection: Volcan de Irazú, Azahar de Cartago, Volcan de Póas, Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Volcan de Irazú, Volcan de Turrialba, Ujurrás de Térraba (Carriker). Five skins.

This species is easily distinguished from the three following by the white superciliary stripe. It is confined to the high mountains of the interior and is seldom seen below 7,000 feet. There is a skin in Mr. Bangs' collection labelled Cariblanco de Sarapiquí, by Underwood, the authenticity of which I doubt very much. It is a rare occurrence to take *C. novicius regionalis* as low as Cariblanco, and that species is rarely found as high as *C. pileatus*, so that there is much room for doubt concerning this locality. It is especially abundant just below timber-line on the high volcanoes, but is also found in the higher parts of the Dota Mountains and the Talamanca Cordillera.

They associate in flocks of from five or six to fifteen or twenty, and utter a soft, lisping, musical note, as they move along from branch to branch through the forest.

656. ***Chlorospingus olivaceiceps*** Underwood.

*Chlorospingus olivaceiceps* UNDERWOOD, Ibis, 1898, 612 (Carrillo, Nov. 24, 1897 [C. F. Underwood]).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 166 (eastern Costa Rica: Carrillo).

U. S. Nat. Museum: Guayábo, March, 1908, four males (Ridgway and Zeledón).

Bangs Collection: Carrillo, one adult male (Underwood), Nov. 3, 1898.

Carnegie Museum: Volcan de Turrialba, 2,000 feet, April 17, 1903, female (Carriker & Crawford).

This is one of the very rare tanagers of Costa Rica, but seven specimens of it being in existence, including the type. It is, apparently, confined to the Caribbean foot-hills, from an altitude of about 1,000 up to 2,000 or 2,500 feet, inhabiting the heavy damp forests found in that region. There are no records for the birds south of the Reventazón Valley, nor north of Carrillo, on the Rio Súcio, nor did Underwood get it at La Vijagua in 1908. It seems to be one of those extremely local forms which are so numerous in Central America, and which are encountered here and there, far from any nearly related species. Underwood's description of this bird is very meagre, so that a full description of it will not come amiss.

*Male*.—Pileum, back, rump and upper tail-coverts, and wing-coverts, uniform olive-green; remiges and rectrices grayish-sooty, broadly edged

on outer webs with the color of the upper parts; lores, suborbital and auricular regions dull grayish olive-brown; chin and throat pale grayish-white, grayer along the sides; a broad band of bright yellowish olive-green across the breast; median portion of lower breast, and abdomen pale grayish-white, nearly pure white in the center of the abdomen; sides and flanks dark yellowish-olive; under tail-coverts the color of the band across chest; maxilla black, mandible horn blue (?); feet leaden horn (?). Measurements: wing, 71 mm.; tail, 58; bill, 13; tarsus, 21.

*Female*.—Does not materially differ from the male, the sexes being similar.

657. ***Chlorospingus novicius novicius*** Bangs.

*Chlorospingus albitemporalis* (not *Tachyphonus albitempora* Lafresnaye) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 101, *part* (Dota [F. Carmiol]?).

*Chlorospingus novicius* BANGS, Proc. New Eng. Zool. Club, II, 1902, 67 (Volcan de Chiriquí, Panama; W. W. Brown; coll. E. A. and O. Bangs).

U. S. Nat. Museum: El Copéy, La Lagunaria, and Santa Maria de Dota (Basulto) (?).

Carnegie Museum: Ujurrás de Térraba (Carriker). Four skins.

I have examined a specimen of *Chlorospingus albitempora* (Lafr.), from Ecuador, and find that it differs very much in several particulars from Costa Rican birds, especially in the much smaller bill, so that *C. novicius* Bangs is undoubtedly a good species.

The range of this bird in Costa Rica is confined to the high mountains of the southern portion of the country, between 4,500 and 7,000 feet. I have referred birds from the Dota Mountains to this form, rather than to the northern race (*C. n. regionalis*), although I have not seen specimens from there, relying on their being the same as the birds from Ujurrás de Térraba.

658. ***Chlorospingus novicius regionalis*** (Bangs).

*Chlorospingus albitemporalis* (not *Tachyphonus albitempora* Lafresnaye) CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 171 (San José, Costa Rica [Frantzus]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 101, *part* (San José [Frantzus], Turrialba and Barránca [J. Carmiol], San Mateo [Cooper]).—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).—BOUCARD, P. Z. S., 1878, 55 (La Laguna, Juan Viñas, Navarro).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 315, *part* (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 239, *part* (Volcan de Irazú [Arcé and Rogers]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (La Palma de San José, Naránjo de Cartago).

*Chlorospingus albitempora* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 163, *part* (Costa Rica: Barránca, Navarro, San José, Turrialba, San Mateo, Volcan de Irazú, Rio Súcio).

*Chlorospingus regionalis* BANGS, Proc. Biol. Soc. Wash., XIX, 1906, 112 (Cariblanco de Sarapiquí [C. F. Underwood]; coll. E. A. and O. Bangs).

U. S. Nat. Museum: Coliblanco and Guayábo (Ridgway and Zeledón), Cedral de Asserí, Juan Viñas (Underwood), La Estrella de Cartago (Zeledón), Azahar de Cartago (Alfaro), Buena Vista (Castro and Fernandez).

Bangs Collection: Cerro de Santa Maria, Volcan de Irazú, Cariblanco de Sarapiquí, Azahar de Cartago, Carrillo, La Hondura (Underwood).

Carnegie Museum: Volcan de Irazú, La Hondura (Carriker), twenty-four skins; El Coronél, Cariblanco de Sarapiquí, and Azahar de Cartago (Underwood), four skins.

This common Costa Rican *Chlorospingus*, known so long under the name of *albitemporalis*, was separated from *C. albitempora* (Lafresnaye) by Mr. Bangs and given specific rank.

It is true that it is very different from *C. albitempora* (Lafr.), differing from it in nearly the same manner as does *C. novicius* Bangs, but we find a very close relative to it in *novicius* of southern Costa Rica and Chiriquí, from which it is only subspecifically distinct. This form may be distinguished from *C. n. novicius* at a glance by the dark color of the olive band across the chest, which in that form is bright yellowish-olive.

The range of this form takes in all of the highlands and mountains of Costa Rica with the exception of the extreme southern part of the country, where it is replaced by *C. n. novicius* of Chiriquí and Panama. The bird descends to at least 1,200 feet on the Caribbean slope, ranging from that altitude up to 8,000 or 9,000 feet, where it meets the two forms *C. pileatus* and *C. zeledoni* of the higher elevations. On the Pacific slope the bird is wanting below 5,000 feet, in fact it is not common on the western side of the plateau region, preferring the cooler, more humid forests of the eastern side of the country.

It is a bird of the forest, not being found outside of it, and associates in small bands, which go roaming about through the forest in search of food, continuously uttering their soft musical notes. As a rule they do not go up very high in the trees, preferring the low limbs and shrubbery. They are very tame and unsuspicious, allowing themselves to be closely approached before taking alarm.

#### 659. *Chlorothraupis carmioli* (Lawrence).

*Phaenicothraupis carmioli* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 100 (Angostura, Costa Rica, March 11, 1865 [F. Carmiol]; coll. U. S. Nat. Mus.).—SALVIN, Ibis, 1869, 313 (crit.).—RIDGWAY, Proc. U. S. Nat. Mus., VI, 411

(Angostura; crit.).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, plate 20, fig. 1.

*Phoenicotheraupis carmioli* FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).

*Chlorotheraupis carmioli* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 299 (Volcan de Turrialba [Carmioli]; Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 194 (Turrialba [Carmioli]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Rio Súcio).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 155 (Nicaragua to N. Peru;—Costa Rica: Angostura, Turrialba, Rio Súcio, Valsa).—BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 37 (La Vijagua; note on peculiar coloration).

U. S. Nat. Museum: Reventazón (Carranza), San Carlos (Alfaro).

Bangs Collection: Cariblanco de Sarapiquí, Carrillo, La Vijagua, about sixty skins (Underwood).

Carnegie Museum: Guápiles and Volcan de Turrialba, 2,000 feet (Carriker & Crawford), Carrillo, Rio Sicsola (Carriker), ten skins; Carrillo and Cariblanco de Sarapiquí (Underwood), two skins.

This tanager is confined to the Caribbean foot-hills from 1,000 up to about 2,500 feet, with the region of greatest abundance between 1,200 and 2,000 feet. I found it present in small numbers in southeastern Costa Rica, in the foot-hills back of the Sicsola River, also in the hills to the south of the Santa Clara Valley, but it seems to be very abundant farther north, near the Nicaraguan boundary, where Underwood secured a series of about sixty skins at La Vijagua. It is found only in the heavy damp forests and keeps near the ground like *Phænicotheraupis*, having habits very similar to those of *P. fuscicauda fuscicauda*.

Mr. Bangs' series of skins from La Vijagua exhibits a very curious color phenomenon, which he mentions in a recent note on that species (Proc. Biol. Soc. Wash., XXII, 1909, 37), consisting in irregularly scattered markings of dull vermilion about the head, scapulars, and throat, which he suggests may be the outcropping of the color of some ancestral type from which it has descended, which supposition seems to be the most plausible explanation of the phenomenon.

#### 660. *Phænicotheraupis alfaroana* Ridgway.

*Phænicotheraupis vinacea* (not of Lawrence) UNDERWOOD, Ibis, 1896, 435 (Miravalles).

*Phænicotheraupis alfaroana* RIDGWAY, Proc. Biol. Soc. Wash., XVIII, 1905, 212 (Miravalles, Costa Rica [C. F. Underwood]; coll. U. S. Nat. Mus.).—BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 337 (Tenorio and Cerro de Santa Maria and Miravalles [Underwood]; critical).

Acad. Nat. Sci. Philadelphia: Miravalles (Underwood).

Carnegie Museum: Miravalles and Bagáces (Carriker). Eleven skins.

Mr. Bangs, in a recent article (Proc. Biol. Soc. Wash., XXII, 1909, 37), says that on account of the great variation in specimens of this species from Tenorio and Cerro de Santa Maria, he is inclined to class it as a subspecies of *P. rubica*, but that it is very different from *P. rubica nelsoni*. I have examined the series in question, and while there is certainly a great deal of individual variation present, I would hesitate to class the bird as a subspecies of *P. rubica*, the two birds occupying (over a small area) the same range. It is not impossible that it has interbred with *P. rubica* to some extent, thus producing the darker birds found occasionally at Tenorio and Cerro de Santa Maria. At all events I think it best to let it remain as a distinct species for the present.

Its range seems to be confined to the northwestern portion of the country, from the Tempisque River northward along the higher part of the lowlands and the foot-hills of the Pacific, up to at least 2,000 feet, possibly a little higher. It is not common below 1,000 feet, but one specimen being secured at Bagáces. Its habits are practically the same as those of *P. rubica vinacea*.

661. ***Phoenicotheraupis fuscicauda fuscicauda* Cabanis.**

*Phoenicotheraupis fuscicauda* CABANIS, Jour. für Orn., 1861, 86 (Costa Rica; coll. Berlin Mus.).—FRANTZIUS, Jour. für Orn., 1869, 299 (Sarapiquí and Angostura).

*Phænicotheraupis fuscicauda* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (Angostura [J. Carmiol]).—BOUCARD, P. Z. S., 1878, 55 (San Carlos).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 302 (Bebedéro [Arcé]; Costa Rican references).—RIDGWAY, Proc. U. S. Nat. Mus., VI, 1884, 414 (Pacuare [J. Cooper]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 199, *part* (C. R. references).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 152 (S. Nicaragua to N. Colombia).

*Phænicotheraupis fuscicauda* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Costa Rica).—RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 490 (Rio Frio).

U. S. Nat. Museum: Bebedéro (Underwood), Jiménez (Cherrie).

Bangs Collection: Tenorio, La Vijagua, Tucurríqui, Jiménez (Underwood).

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford), Guácimo, Cuábre, Rio Sicsola, El Hogar, Esparta, Tucurríqui (Carriker). Twelve skins.

This bird ranges over the whole of the Caribbean lowlands and lower slopes, up to at least 2,000 feet, and on the Pacific lowlands and foot-hills,

in small numbers, from the Rio Grande de Tárcoles northward through Guanacaste. It is not so abundant as the preceding species, even in the Caribbean lowlands, and is rarely taken on the northern Pacific slope. Both Underwood and Arcé took it at Bebedéro, while Underwood secured seven skins at Tenorio. I secured but one bird at Esparta. Its habits are very similar to those of *P. rubica vinacea*, except that it is more often met with alone or in pairs, and never in such large bands as that bird. It is just as noisy and just as shy, always keeping on the move, and very hard to approach.

662. ***Phænicothraupis rubica vinacea*** (Lawrence).

*Phænicothraupis rubicoides* (not *Saltator rubicoides* Lafresnaye) CASSIN, Proc. Acad. Nat. Sci. Phila., IV, 1865, 171 (Grecia, Costa Rica [J. Carmiol]).

*Phænicothraupis vinacea* LAWRENCE, Proc. Acad. Nat. Sci. Phila., XIX, 1867, 94 (Panama; coll. G. N. Lawrence); Ann. Lyc. N. Y., IX, 1868, 99 (Guaitíl [J. Carmiol], Grecia [F. Carmiol]).

*Phænicothraupis vinacea* FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).

*Phænicothraupis vinacea* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 301 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 197 (Grecia [Carmiol]).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 24 (Boruca, Térraba, and Buenos Aires).

*Phænicothraupis vinacea* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Tambór de Alajuéla, Guaitíl).

*Phænicothraupis rubica vinacea* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 146 (Costa Rica to Panama).—BANGS, Auk, XXIV, 1907, 309 (Boruca and Lagarto [Underwood]).

U. S. Nat. Museum: Monte Redondo (Zeledón), Tambór (Alfaro).

Bangs Collection: Bolson, El General, and Buenos Aires de Térraba (Underwood).

Carnegie Museum: Boruca, Buenos Aires (Carriker). Eleven skins.

This *Phænicothraupis* is confined to the western, or Pacific slope of the plateau region and the foot-hills, from near sea-level up to at least 4,000 feet. Its range covers the whole of the Pacific slope with the exception of the extreme northern portion of the country, from the Volcan de Tenorio and Miravalles, northward, where its place is taken by the pale form, *P. alfaroana*.

It is an abundant bird in many parts of its range, always associating in flocks, when not breeding, and roaming about through the forest in search of food. The birds keep near the ground in the dense forest, only rarely flying up into the trees. When disturbed they are very noisy, chattering and calling in a harsh, excited manner, thus always making

their presence known. In spite of their noisy manner, they are very hard to collect, having a way of slipping about in the underbrush and keeping out of sight which is very exasperating to the collector.

663. ***Eucometis spodocephala spodocephala*** (Bonaparte).

*Chlorospingus spodocephala* BONAPARTE, Compt. Rend., XXXIX, 1854, 922 (Nicaragua; coll. Delattre).

*Eucometis spodocephala* SCLATER, Cat. Am. Birds, 1862, 84 (Nicaragua); Cat. Birds Brit. Mus., XI, 1886, 219, *part* (Nicoya, Costa Rica [Arcé]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 100 (Costa Rica).—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 307 (Costa Rican references: Tempate [Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Las Trojas de Puntarenas).—UNDERWOOD, Ibis, 1896, 435 (Bebedéro to Miravalles).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 139 (Nicaragua and Costa Rica: Las Trojas, Tempate, Nicoya, Volcan de Miravalles).

U. S. Nat. Museum: Bebedéro (Underwood).

Bangs Collection: Miravalles, Tenorio, Bolson (Underwood).

Carnegie Museum: Bagáces, Miravalles (Carriker). Four skins.

After a very careful examination of a large series of skins of *Eucometis spodocephala* from different parts of Costa Rica, Mr. Bangs and myself decided that all birds taken north of the Rio Grande de Pirrís (Pózo Azúl) were referable to true *spodocephala*, some of them being exactly typical of northern birds, while others were slightly intermediate with a tendency towards the streaking of the breast as in the southern race, *E. spodocephala stictothorax*.

This species is confined strictly to the Pacific coast region in Costa Rica, ranging from near sea-level up to at least 2,000 feet. They seem to have no preference between the heavy forest and the more open woodland and second-growth scrub, being found equally abundantly in all places. They are inclined to be noisy, but not nearly so much as *Mitrospingus cassini* or *Phænicothraupis*, nor do they associate in flocks so much as those birds, solitary individuals being very often encountered.

664. ***Eucometis spodocephala stictothorax*** Berlepsch.

*Eucometis spodocephala* (not *Chlorospingus spodocephala* Bonaparte) SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, *part* (no Costa Rican references or specimens applying to this form).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 219, *part* (no C. R. specimens).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 25 (Boruca, Térraba, and Buenos Aires).

*Eucometis spodocephala stictothorax* BERLEPSCH, Auk, V, 1888, 451, 452 (Chiri-



quí; coll. Count von Berlepsch).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 141 (Chiriquí).—BANGS, Auk, XXIV, 1907, 309 (Boruca, Paso Real, El Pózo, and Lagarto de Térraba [Underwood]).

Bangs Collection: El General and Buenos Aires de Térraba; Pózo Azul de Pirrís (Underwood).

Carnegie Museum: El Pózo de Térraba, Boruca, Buenos Aires, and Pózo Azul de Pirrís (Carriker). Fifteen skins.

This is a very poor race, if indeed it can be maintained as such, a great deal of variation being shown among specimens from the same locality. It may be that all the skins examined of this form are from the transition zone and are not true *stictothorax*, and that birds from farther south will present more constant characters. At all events it is perhaps best to recognize it until additional material shall decide the question definitely one way or the other. The specimens from southwestern Costa Rica show a marked streaking of the chest and a darker coloration below, characters given as diagnostic of the subspecies, so that they are at least referable to it, if not quite typical.

Its habits and habitat are the same as those of the preceding species.

#### 665. *Tachyphonus delatrii* Lafresnaye.

*Tachyphonus delatrii* LAFRESNAYE, Rev. Zool., 1847, 72 (San Buenaventura, Colombia).—CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 171 (Pacuare [Carmioli]).—SCLATER and SALVIN, Exotic Orn., 1868, 67, pl. 34, male.—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).—BOUCARD, P. Z. S., 1878, 55 (San Mateo).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 312 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 215 (no Costa Rican specimens).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Pacuare).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 136 (Costa Rica: Talamanca, Pacuare, San Mateo, etc., southward to western Ecuador). *Tachyphonus delatrei* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 100 (Pacuare [J. Carmiol]).

*Chlorospingus brunneus* LAWRENCE, Ann. Lyc. N. Y., X, 1874, 395 (Talamanca [Zeledón]; coll. U. S. Nat. Mus.; female).—SALVIN, Ibis, 1874, 308 (critical).

U. S. Nat. Museum: Jiménez (Underwood), Reventazón (Carranza).

Bangs Collection: Carrillo, four specimens (Underwood).

Carnegie Museum: Guácimo, Carrillo, El Hogar (Carriker), eleven skins; Carrillo (Underwood), three skins.

With one exception all the Costa Rican records of this species are from the Caribbean lowlands and foot-hills. Boucard records the bird from San Mateo, but no subsequent or earlier collectors have ever taken it in that vicinity or in any other part of the Pacific lowlands or foot-hills, so

that it seems probable that, if the bird was actually taken at San Mateo, it was only a rare straggler in that region. From my own experience I should say that the bird was confined to the Caribbean foot-hills and the higher parts of the lowlands, from about 500 to 2,000 feet. I found it most abundant at about 800 to 1,000 feet in the vicinity of Guácimo, where on several occasions flocks were seen. It seems to be one of the traits of the bird to associate in flocks of from six to twenty or more. They are partial to dark damp places in the forest, the underbrush along creeks, and boggy woodland, where they keep near the ground, moving continuously from bush to bush or tree to tree, all the while chattering and calling in a noisy manner. They are very shy and difficult to approach within gunshot, and on the whole are very rare birds in Costa Rica.

666. *Tachyphonus nitidissimus* Salvin.

*Tachyphonus nitidissimus* SALVIN, P. Z. S., 1870, 188 (Bugába, Chiriquí; coll. Salvin and Godman).—RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 412 (Pirrís, Costa Rica; crit.).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 312, *part*, pl. 21, figs. 2 and 3 (Bugába, Panama).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 214, *part* (Chiriquí).—CHERRIE, Expl. Zool. en el Rio Naránjo, 1893, 14 (Rio Naránjo); Expl. Zool. en C. R., 1891-2, 1893, 26 (Palmár, Lagarto, Boruca, and Térraba).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 136 (Veragua, Chiriquí, and southwestern Costa Rica: Pirrís).—BANGS, Auk, XXIV, 1907, 399 (Boruca, Paso Real, El Pózo, and Barranca de Térraba [Underwood]).

*Tachyphonus luctuosus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110, *part* (Pózo Azul de Pirrís).

U. S. Nat. Museum: Pózo Azul de Pirrís and Pózo Pital (Cherrie).

Bangs Collection: Pózo Azul de Pirrís, El General, and Buenos Aires de Térraba (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Térraba, Boruca, and Buenos Aires (Carriker). Eight skins.

This species is confined to the southwestern portion of Costa Rica, so far as now known, not having been taken north of the Rio Grande de Pirrís, but in all probability it extends as far north as the valley of the Rio Grande de Tarcoles. It is confined to the lowlands and lower foot-hills, ranging from sea-level up to perhaps 1,500 feet. Like the succeeding form, it is a bird of the more open forest, and is partial to trees along the margins of small streams. Contrary to my experience with *T. axillaris*, I found this form inclined to be gregarious, finding upon one occasion at Buenos Aires a small flock, containing about four or five pairs. This

was late in August, when the birds were undergoing the postnuptial moult.

667. ***Tachyphonus axillaris*** (Lawrence).

*Tachyphonus luctuosus* (not of Lafresnaye and D'Orbigny) CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 171 (Angostura, March 10, 1864 [J. Carmiol]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 100 (Angostura and Tuís [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).—BOUCARD, P. Z. S., 1878, 55 (San Carlos).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 310, *part* (Valsa [Carmiol]).—RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 412 (Talamanca, Dos Novillos, Tuís; critical).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 208, *part* (Angostura [Carmiol]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110, *part* (Angostura).

*Tachyphonus nitidissimus* (not of Salvin) SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 312, *part* (Costa Rican references: Valsa [Carmiol]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 214, *part* (Valsa [Carmiol]).

*Chlorospingus axillaris* LAWRENCE, Ann. Lyc. N. Y., X, 1874, 395 (Talamanca, Costa Rica; coll. U. S. Nat. Mus.).—SALVIN, Ibis, 1874, 395 (critical; refers it to *T. nitidissimus*).

*Tachyphonus axillaris* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 134 (southeastern Honduras to Costa Rica: Angostura, Valsa, Talamanca).

U. S. Nat. Museum: Bonilla, Guayábo (Ridgway), La Concepcion de Jiménez (Cherrie).

Bangs Collection: Carrillo and La Vijagua (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), Carrillo, El Hogar, Peralta (Carriker), Juan Viñas and Carrillo (Underwood). Twelve skins.

This bird was regarded as synonymous with *T. nitidissimus* until Mr. Ridgway cleared up the tangle in which this group of species had been involved. *T. axillaris* is the northern form of *T. luctuosus*, and has nothing at all to do with *T. nitidissimus*, being easily distinguished from that bird by the pale yellow color of its concealed crown-patch, *T. nitidissimus* possessing a partly concealed crown-patch of orange-red. The geographical ranges of the two forms cannot be confused in Costa Rica, *T. axillaris* being found only on the Caribbean lowlands and slopes, up to not more than 2,500 feet, while *nitidissimus* is found only in the southwestern Pacific lowlands.

This species is a woodland bird, being found as a rule rather low down in the more open parts of the forest, where the trees are lower and covered with vines. It is not common, and is met with only singly or in pairs.

668. *Tachyphonus rufus* (Boddaert).

*Tanagra rufa* BODDAERT, Tabl. Plan. Enl., 1783, 44 (based on *Le Tangaroux de Cayenne* Buffon. Pl. Enl., 711; adult female).

*Tachyphonus rufus* ALLEN, Bull. Am. Mus. Nat. Hist., III, 1891, 359 (Chapada, Brazil).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 130 (Costa Rica, southward through Central America and South America in general).

*Tachyphonus melaleucus* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 309 (Costa Rica [Van Patten]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 206 (Costa Rica [Van Patten]; coll. Salvin and Godman, adult ♂).

The only authority we have for placing this species on the Costa Rican list is one adult male taken by Van Patten at some unknown locality in Costa Rica and recorded by Messrs. Salvin and Godman. Although the skin bears no locality label beyond that of Costa Rica, it was most probably taken somewhere in the southeastern part of the country. It is a bird we would expect to find there, for it has been taken abundantly in northern Chiriquí, and has doubtless only been overlooked thus far because little collecting has been done in eastern Costa Rica contiguous to Chiriquí.

669. *Lanio melanopygius* Salvin and Godman.

*Lanio leucothorax* (not of Salvin, 1864) SCLATER and SALVIN, Exotic Orn., pt. iv, 1867, pl. 32 (fig. of male).

*Lanio melanopygius* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 305 (ex "*Lanio leucothorax melanopygius* Ridgway, Proc. U. S. Nat. Mus., 1883"; Bugába, Chiriquí; coll. Salvin and Godman).—RIDGWAY, Proc. U. S. Nat. Mus., VI, April 11, 1884, 412 (Pirrís, Costa Rica; critical).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 203 (no Costa Rican specimens).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Pózo Azul de Pirrís).—CHERRIE, Expl. Zool. en el Rio Naránjo, 1893, 13 (Pózo Pital); Expl. Zool. en C. R., 1891-2, 1893, 25 (Palmár and Boruca).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 125 (Veragua, Chiriquí, and southwestern Costa Rica: Pózo Pital and Pózo Azul de Pirrís).—BANGS, Auk, XXIV, 1907, 309 (Boruca and El Pózo de Térraba [Underwood]).

Bangs Collection: Pózo Azul de Pirrís (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Térraba, and Boruca (Carriker). Fifteen skins.

This *Lanio* is confined to the southwestern portion of the Pacific lowlands and lower foot-hills, from the Pirrís Valley southward and from sea-level up to about 1,500 feet. It is most abundant at lower altitudes, below 800 feet. I found it quite numerous in certain localities around El Pózo de Térraba, in the heavy forest of the flat land just back of the Rio Grande River. It is not gregarious like many of the tanagers, but

is always found in pairs. It has a characteristic note which can be heard for some little distance in the forest and by which the birds are easily located.

670. **Lanio leucothorax** Salvin.

*Lanio leucothorax* SALVIN, P. Z. S., 1864, 581 (Tucurríqui, Costa Rica [Arcé]; coll. Salvin and Godman).—CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 169 (Angostura and Tucurríqui [Carmioli]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 100 (Tucurríqui, Angostura, and Pacuare [J. Carmioli]).—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).—RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, 412 (Angostura and Tucurríqui [J. Carmioli]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 305 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 203 (Angostura [Carmioli], Tucurríqui [Arcé]).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 124 (eastern Nicaragua to central Costa Rica: Angostura, Tucurríqui, and Pacuare).

Bangs Collection: La Vijagua, February and March, 1908, twenty skins; Carrillo, small series (Underwood).

It appears that this bird is very local. Previous to Underwood's trip to La Vijagua in 1908, there were very few specimens in existence from Costa Rica, certainly not more than a dozen, and practically all of these came from the valleys of the Reventazón or Pacuare Rivers. It is evidently commoner farther north, at least in the vicinity of La Vijagua. From the evidence at hand, the range of the species in Costa Rica covers the Caribbean slope from about 1,200 feet up to 2,500 feet, with the centre of greatest abundance in the northern part of the country. There are no records of capture south of the Pacuare River, but the bird undoubtedly occurs in eastern Talamanca in small numbers. It is exclusively an inhabitant of the heavy virgin forest, which it never leaves, seeking out the dark damp portions, especially along creeks. It has a characteristic tanager-like note, but is inclined to be quiet.

671. **Phlogothraupis sanguinolenta aprica** Bangs.

*Tanagra (Tachyphonus) sanguinolenta* LESSON, Cent. Zool., 1830, 107, pl. 39 (Mexico).

*Ramphocelus sanguinolentus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (Navárrro [Cooper], Angostura [Carmioli]).—FRANTZIUS, Jour. für Orn., 1869, 299 (same localities as *Ramphocelus passerinii*, but a much rarer bird).

*Phlogothraupis sanguinolenta* BOUCARD, P. Z. S., 1878, 55 (Orósi).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 285, *part* (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 178, *part* (Angostura [Carmioli], Navárrro [Cooper], Tucurríqui [Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Cartago and Navárrro).—RICHMOND, Proc. U. S. Nat. Mus.,

XVI, 1893, 489 (Rio Frio).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 120, *part* (southeastern Mexico to Costa Rica: Cartago, Navarro, Angostura, Orósi, San Carlos, Sarapiquí, etc.).

*Phlogothraupis sanguinolenta aprica* BANGS, Proc. New Eng. Zool. Club, III, 1908, 31 (Carrillo, Costa Rica, ♂, Nov. 11, 1897 [Underwood]; coll. E. A. and O. Bangs).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Jiménez and Reventazón (Carranza).

Bangs Collection: Carrillo and Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: El Hogar and Peralta (Carriker). Three skins.

The range of this bird covers the whole of the Caribbean slope from about 600 feet up to 3,000 feet, a few straggling higher. It is not common below 1,200 feet, being rarely seen, indeed it is not an abundant bird at any point. It frequents wooded pastures, open woodland, and second-growth scrub, but as a rule keeps higher above the ground than *Ramphocelus*. It is not noisy, but occasionally utters a note similar to that of *Ramphocelus*.

#### 672. *Ramphocelus passerinii* Bonaparte.

*Ramphocelus passerinii* BONAPARTE, Antologia, 1831, no. 130, p. 3 (Mexico or Cuba).—CABANIS, Jour. für Orn., 1860, 330 (Costa Rica [Hoffmann]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (Angostura and San Carlos [J. Carmiol], Navarro [J. Cooper]).—FRANTZIUS, Jour. für Orn., 1869 (Angostura. Navarro, Orósi, Tucurrique, San Carlos, and Sarapiquí).—BOUCARD, P. Z. S., 1878, 55 (San Carlos and Juan Viñas).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Navarro, Jiménez, Juan Viñas, and Esparta).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 109 (southeast Mexico to Isthmus of Panama). *Rhamphocelus passerinii* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 281, *part*, pl. 18, fig. 1 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 176, *part* (Tucurrique [Arcé], Angostura, and San Carlos [Carmiol]).

*Rhamphocelus passerinii* SALVADORI, Att. Roy. Ac. Torino, IV, 1868, 177 (Costa Rica).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway and Alfaro) (Basulto), Turrialba (Ridgway).

Bangs Collection: Carrillo, Juan Viñas, Cariblanco de Sarapiquí, La Vijagua (Underwood).

Fleming Collection: Limon (Underwood).

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford), Juan Viñas, Rio Sicsola, El Hogar, Carrillo (Carriker), Carrillo, La Honduras, Cariblanco de Sarapiquí, Tucurrique, El Coronel (Underwood). Twenty-nine skins.

This is a very common tanager over the Caribbean lowlands and lower slopes, wherever cleared or cultivated lands are found. It also frequents the high grass and wild cane along the margins of the rivers, but is especially fond of second-growth scrub and bushy pastures and roadsides. It is found regularly up to 3,000 feet, and stragglers have even been taken as high up as Cartago. There are several records for this bird from the Pacific slope, but I am quite positive that it does not occur there, and that all references to it on the Pacific slope actually pertain to *R. costaricensis*. The males of the two species are absolutely indistinguishable, which would lead to an error of that kind were no females taken. The birds are usually quite noisy, their notes under ordinary circumstances being quite harsh and unmelodious. They have, however, a very fine song which I have rarely heard and then only in the early morning in some secluded spot when the male thought he was unobserved. Mr. Cherrie mentions this same song in connection with *R. costaricensis*.

I found the birds breeding abundantly about Guápiles, Jiménez, and El Hogar, and numerous nests with fresh eggs were taken or observed during May and June. A nest taken near Jiménez, May 12, 1905, was typical of the species. It was made of leaves, grass, and roots, lined with rootlets, the whole put together in a very loose, slipshod manner, and placed in a large clump of grass near the railroad track. The nest is built in a great variety of locations, sometimes near the ground in clumps of grass or on the limbs of large shrubs and low trees. Two eggs are invariably laid, of varying shades of pale blue or greenish-blue, with a few markings of lilac, sparsely spotted and dotted over the entire surface with burnt umber, very much like the eggs of the Red-winged Blackbird. The average measurements are: 23×17 mm.

### 673. *Ramphocelus costaricensis* Cherrie.

*Ramphocelus passerinii* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 391 (between San José and Puntarenas).

*Rhamphocælus passerinii* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 281, *part* (Barránca [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 176, *part* (Barránca [Arcé]).

*Ramphocelus costaricensis* CHERRIE, Auk, VIII, 1891, 62 (Pózo Azul de Pirrís; coll. U. S. Nat. Mus.); Proc. U. S. Nat. Mus., XIV, 1891, 531 (crit.).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 111 (southwestern Costa Rica: Pózo Azul, Boruca, Palmar, Buenos Aires).—BANGS, Auk, XXIV, 1907, 309 (Boruca, Paso Real, El Pózo de Térraba (Underwood)).

*Ramphocælus costaricensis* CHERRIE, Auk, X, 1893, 278 (Boruca, Palmar, and Buenos Aires; habits, song, etc.; descr. adult male).

*Rhamphocelus costaricensis* CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 20 (Palmar, Lagarto, Boruca, Térraba, and Buenos Aires).

U. S. Nat. Museum: Pígres (Ridgway, Zeledón, Alfaro).

Bangs Collection: Pózo Azul de Pirrís, El General de Térraba, Buenos Aires (Underwood).

Carnegie Museum: El Pózo, Boruca, and Buenos Aires (Carriker). Twelve skins.

This species is confined to the southwestern Pacific lowlands and slopes, from Puntarenas southward into Chiriquí. Its habits, habitat, song, and breeding are practically the same as those of its near relative of the Caribbean slope, *R. passerinii*. I found the birds breeding at Pózo Azul de Pirrís, two nests being taken on May 8, 1902, one set fresh, and the other slightly incubated.

674. **Hemithraupis chrysomelas** (Sclater and Salvin).

*Tachyphonus chrysomelas* SCLATER and SALVIN, P. Z. S., 1869, 440 (Cordillera de Chucu, Veragua; coll. Salvin and Godman).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 311, pl. 21, fig. 1 (no Costa Rican reference).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 210 (Costa Rica).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Costa Rica).

*Hemithraupis* CABANIS, Mus. Hein., 1850, 21 (type, *Nemosia ruficapilla* Vieillot).

*Hemithraupis chrysomelas* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 106 (Veragua and Costa Rica: Talamanca).

U. S. Nat. Museum: Bonilla (Basulto) (Ridgway and Zeledón).

Bangs Collection: Carrillo and Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Volcan de Turrialba, 2,000 feet (Carriker & Crawford), Carrillo (Carriker). Thirty skins.

This warbler-like tanager is confined to the foot-hills of the Caribbean slope, from 1,200 to about 2,500 feet. It is most abundant in the northern part of the country, from the Reventazón River northward, and reaches its point of greatest abundance in the vicinity of Carrillo, seeming to thrive better in the very humid conditions which prevail at that point. It is an inhabitant of the heavy virgin forest, keeping well up in the trees like the tanagers and many of the warblers, and seems to be almost if not entirely insectivorous.

675. **Heterospingus rubrifrons** (Lawrence).

*Tachyphonus xanthopygius* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 311, *part* (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 209, *part* (Costa Rica).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Costa Rica).



*Tachyphonus rubrifrons* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1865, 106 (Lion Hill, Panama).—RIDGWAY, Proc. U. S. Nat. Mus., XVI, 1893, 610, 611 (Angostura and Reventazón; critical).

*Tachyphonus propinquus* LAWRENCE, Proc. Acad. Nat. Sci., Phila., 1867, 94 (substitute for *T. rubrifrons*, considered inappropriate as being based on an accidental character; Angostura, Costa Rica, [J. Carmiol]); Ann. Lyc. N. Y., IX, 1868, 101 (Angostura, Costa Rica [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).—SALVIN, Ibis, 1870, 109 (critical).

*Heterospingus* RIDGWAY, Auk, XV, 1898, 225 (type, *Tachyphonus rubrifrons* Lawrence).

*Heterospingus rubrifrons* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 104 (Isthmus of Panama to Costa Rica: Reventazón and Angostura).

U. S. Nat. Museum: Pacuarito (Cherrie).

Bangs Collection: Reventazón, one ♀ (Underwood).

This is a very rare bird in Costa Rica, as well as throughout its entire range, very few specimens of it being in existence. All the specimens taken (three in number) were collected along the Reventazón Valley, between 500 and 2,000 feet. Its habits are probably the same as those of *Tachyphonus*.

#### 676. *Piranga leucoptera latifasciata* Ridgway.

*Piranga erythromelæna* (not *P. erythromelas* VIEILLOT, nor *Tanagra erythromelas* Lichtenstein) SALVADORI, Atti Roy. Ac. Sci. Torino, IV, 1868, 177 (Costa Rica).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (Navárrro [Cooper], Barránca, and Dota [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).—BOUCARD, P. Z. S., 1878, 55 (Juan Viñas and La Candelaria).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 295, *part* (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 189, *part* (Dota [Carmiol], Tucurríqui [Arcé]).

*Piranga leucoptera latifasciata* RIDGWAY, Man. N. Am. Birds, 1887, 457 (Costa Rica); Birds N. and Mid. Amer., II, 1902, 101 (Veragua and Costa Rica: Barránca, Dota Mts., Navárrro, and Tucurríqui).

*Piranga leucoptera* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Costa Rica).—CHERRIE, Auk, IX, 1892, 24 (San José; a rare resident).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), El Copey, La Lagunaria, and Santa Maria de Dota (Basulto), Naránjo de Cartago (Alfaro and Zeledón).

Bangs Collection: Azahar de Cartago, La Estrella de Cartago, and Escazú (Underwood).

Field Museum: Juan Viñas (Carriker).

This is a very rare bird in most parts of Costa Rica, being confined strictly to the plateau regions and the mountains rising above it. It

seems to be most abundant in the Dota Mountains, more specimens having come from that region than any other. It is found in the forest as well as along the edges of woodland and in scattering trees. I hunted carefully for this bird at Juan Viñas, and succeeded in finding but a single pair, the male of which was secured. They were in a small clump of trees in a pasture.

677. ***Piranga bidentata sanguinolenta*** (Lafresnaye).

- Piranga bidentata* (not of Swainson) CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 171 (Birris, Costa Rica [Frantzius]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (Barranca and Dota [J. Carmiol], San José [Frantzius], Birris [Zeledón], Rancho Redondo [F. Carmiol]).—SALVADORI, Atti Roy. Ac. Sci. Torino, IV, 1868, 177 (Costa Rica).—FRANTZIUS, Jour. für Orn., 1869, 299 (Dota Mts., Candelaria, Cervantes, Rancho Redondo, and Quebrada Honda).—BOUCARD, P. Z. S., 1878, 55 (Navarro and Volcan de Irazú).—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 495 (Volcan de Irazú [Nutting]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 296, *part* (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 190, *part* (Irazú [Rogers]).  
*Piranga bidentata* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (San José, Cartago, El Zarcero de Alajuela, Volcan de Irazú, Monte Redondo).—CHERRIE, Auk, IX, 1892, 25 (San José, rare resident).  
*Piranga sanguinolenta* LAFRESNAYE, Rev. Zool., 1839, 97 (Mexico).  
*Piranga bidentata sanguinolenta* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 96 (eastern Mexico, south through Central America to Chiriquí and Veragua).  
 U. S. Nat. Museum: Volcan de Turrialba (Ridgway and Zeledón), San José (Ridgway), San Juan de Irazú (Zeledón), El Copey and Santa Maria de Dota (Basulto), La Estrella de Cartago.  
 Bangs Collection: San José, Escazú, La Estrella de Cartago, Monte Redondo (Underwood).  
 Carnegie Museum: Volcan de Irazú and Escazú (Carriker). Five skins.

Resident over the whole of the highlands above 3,000 feet and up to timber-line on the high volcanoes. It is a rare bird below 6,000 feet, only a straggler being taken here and there, but is fairly common on the volcanoes between 7,000 and 9,000 feet, especially on the Volcan de Irazú. It is a typical *Piranga* in all its habits, song, etc. It is found in the heavy forest as well as in scattering trees in fields and pastures.

678. ***Piranga erythromelas*** Vieillot.

- Piranga erythromelas* VIEILLOT, Nouv. Dict. d'hist. Nat., XXVIII, 1819, 293, pl. 22, fig. 1.  
*Piranga rubra* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (San José [Frantzius]).  
 —FRANTZIUS, Jour. für Orn., 1869 (San José).—SALVIN and GODMAN, Biol.

Centr.-Am., Aves, I, 1883, 287.—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 188 (Irazú [Rogers]).

*Piranga erythromelas* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Cartago, Naránjo de Cartago, Esparta).—RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 490 (Rio Frio).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 88 (eastern United States, south in winter through Central America, the West Indies, and into northern South America).

U. S. Nat. Museum: Bonilla, April, 1908, two males (Basulto).

A rare winter visitor to Costa Rica, where it is almost if not wholly confined to the highlands.

#### 679. *Piranga testacea testacea* Sclater and Salvin.

*Piranga testacea* SCLATER and SALVIN, P. Z. S., 1868, 388 (Chitra, Veragua; coll. Salvin and Godman).—RIDGWAY, Proc. Acad. Nat. Sci. Phila., 1869, 133, *part* (Angostura, Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 292, pl. 19, fig. 1 and 2 (Costa Rica [Van Patten]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 184, *part* (Costa Rican references).

*Piranga testacea* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (Pózo Azul de Pirris, Naránjo de Cartago, Cartago).

*Piranga testacea testacea* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 86 (Nicaragua to Colombia).—BANGS, Auk, XXIV, 1907, 309 (Boruca and Paso Real [Underwood]).

Bangs Collection: Cerro de Santa Maria, La Vijagua, Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: La Hondura, three ♀'s (Carriker).

This *Piranga* ranges over the upper Caribbean slopes (above 2,000 feet), the central plateau (up to about 5,000 ft.), and the Pacific slope and lowlands, more especially the southwestern portion. It is a rare bird everywhere in Costa Rica, and few are in collections from that country. The birds are very hard to collect, always keeping high up in the trees, and are everywhere hard to approach. They seldom leave the heavy forest. On several occasions I heard their notes in the vicinity of Boruca, but was never able to locate them.

#### 680. *Piranga rubra rubra* (Linnæus).

(*Fringilla*) *rubra* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 181 (based on Summer Redbird, *Muscicapa rubra* CATESBY, Nat. Hist. Carolina, I, 56, pl. 56).

*Piranga rubra* VIEILLOT, Ois. Am., I, 1807, p. iv.—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (San José, Jiménez, San Mateo, Alajuéla, El Zarcéro de Alajuéla).—CHERRIE, Auk, IX, 1892, 25 (San José; Oct. 7 to Jan. 10); Expl. Zool. en C. R., 1891-2, 1893 (Boruca, Térraba, Lagarto).—UNDERWOOD, Ibis, 1896, 435 (Miravalles).

*Pyrranga æstiva* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (Turrialba, Atiro, Grecia [J. Carmiol], San Mateo and Navarro [Cooper], San José, Angostura, and Santa Rosa [F. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 299 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 287 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 182 (Nicoya [Arcé], Atiro [Carmiol], Irazú [Rogers]).

*Phoenisoma æstiva* CABANIS, Jour. für Orn., 1860, 329 (Costa Rica [Hoffmann and Frantzius]).

*Piranga rubra rubra* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 79 (eastern United States, south in winter to Cuba, eastern Mexico, Central America, Ecuador, and British Guiana).

U. S. Nat. Museum: Bonilla (Basulto) (Zeledón), Guayábo (Ridgway and Zeledón).

Bangs Collection: San José, San Pedro, Juan Viñas, Bolson, Tenorio, Cerro de Santa Maria (Underwood).

Fleming Collection: Miravalles and Carrillo (Underwood).

Carnegie Museum: Juan Viñas, Guácimo, La Hondura, El Hogar (Carriker), Guápiles (Carriker & Crawford). Nine skins.

A very common migrant throughout the whole country, and especially in the Santa Clara Valley around the farm-houses and orchards. They are very fond of feeding on oranges, pecking holes in them and eating out the inside as they hang on the trees.

#### 681. *Thraupis palmarum melanopectera* (Sclater).

*Tanagra palmarum* BOUCARD, P. Z. S., 1878, 55 (Juan Viñas and San José).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 279, *part* (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 159, *part* (Tucurríqui [Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Naránjo de Cartago).

*Tanagra melanopectera* CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 171 (Turrialba [Carmiol]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (Santa Rosa and Angostura [J. Carmiol], Turrialba [F. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 298 (Santa Rosa, Angostura, Turrialba, Tucurríqui).

*Tanagra palmarum melanopectera* BERLEPSCH, Jour. für Orn., 1884, 291 (Colombia).

*Thraupis palmarum* FINSCH, P. Z. S., 1870, 580 (Trinidad).

*Thraupis* Boie, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Bonilla (Ridgway) (Basulto), Coliblanco and Guayábo (Ridgway and Zeledón), Jiménez (Verrill), Guayabal and Juan Viñas (Underwood), El Naránjo (Zeledón), Reventazón (Carranza).

Bangs Collection: Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), Carrillo and El Hogar (Carriker). Four skins.

This species has nearly the same range as the following, except that it seems to be entirely absent from the coast and lower slopes of the Pacific side; neither does it go up so high in the interior as *T. cana cana*. It is a much less common bird, and is not always to be found in localities where it would naturally be expected to exist. Its habits and habitat are also practically the same as those of the succeeding species, except that it is inclined to be rather more retiring.

682. ***Thraupis cana cana*** (Swainson).

- Tanagra cana* SWAINSON, Ornith. Drawings (Birds of Brazil), part III, 1834, pl. 37 (no locality).—BOUCARD, P. Z. S., 1878, 54 (San José).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 277 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 156, *part* (Irazú dist. [Rogers]. Tucurríqui and Bebedéro [Arcé], Puntarenas [Salvin]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Alajuela, San José, Cartago, Santa Maria de Dota).—CHERRIE, Auk, IX, 1892, 25 (San José); Expl. Zool. en C. R., 1891-2, 1893, 19 (Boruca and Buenos Aires).—UNDERWOOD, Ibis, 1896, 435 (Miravalles).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 55 (southern Mexico to western Ecuador).—BANGS, Auk, XXIV, 1907, 309 (Boruca [Underwood]).
- Tanagra diaconus* CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 171 (San José).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 99 (San José and Angostura [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869 (Costa Rica).
- Tanagra cana diaconus* RIDGWAY and NUTTING, Proc. U. S. Nat. Mus., V, 1882, 391 (La Palma de Nicoya).—RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 499 (San José).
- Thraupis diaconus* CABANIS, Jour. für Orn., 1860, 330 (Costa Rica [Frantzius, Hoffmann, Ellendorf]).
- Thraupis* Boie, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway) (Basulto), Pígres (Ridgway), San José (Cherrie).

Bangs Collection: Carrillo, Buenos Aires, Bolson, San José, Jiménez (Underwood).

Acad. Nat. Sci. Philadelphia: Miravalles and Bebedéro (Underwood).

Carnegie Museum: Juan Viñas, Tierra Blanca, San José, Guápiles, El Hogar, Esparta, Boruca (Carriker), nine skins; San Pedro and San José (Underwood), three skins.

One of the most abundant birds found in Costa Rica, covering the whole of the plateau region up to about 7,000 feet, the Caribbean slope (where cleared lands are found) down to at least 600 feet, and the whole of the Pacific slope and lowlands.

It is not found in the heavy forest, but is partial to scattered clumps of trees, hedgerows, orchards, and coffee-plantations. It is very fond of all kinds of fruit and berries, evidently preferring them to insects when available.

683. **Tangara larvata larvata** (Du Bus).

*Calliste larvata* DU BUS, Esquiss. Orn., 1845 (?), pl. 9 (Tabasco, southeastern Mexico).—BOUCARD, P. Z. S., 1878, 54 (Juan Viñas, Orósi, and San Carlos).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 274, *part* (Turrialba [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 124, *part* (Turrialba [Arcé and Cooper], Angostura [Carmioll]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109, *part* (Naránjo de Cartago, Cartago, and Jiménez).

*Calliste franciscæ* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Angostura [J. Carmioll], Turrialba [Cooper]).—FRANTZIUS, Jour. für Orn., 1869, 298, *part* (Costa Rica).

*Callispiza franciscæ* SALVADORI, Atti Roy. Ac. Sci. Torino, IV, 1868, 175 (N. E. Costa Rica).

*Calospiza larvata larvata* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 47 (southern Mexico to northern Honduras).

*Tangara* Brisson, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway and Alfaro) (Basulto).

Bangs Collection: Carrillo and Jiménez, large series; Cachí (Underwood).

C. H. Lankester Collection: Sarapiquí and Guácimo.

Carnegie Museum: Guápiles and Guácimo (Carriker & Crawford), Carrillo, El Hogar (Carriker). Twenty-three skins.

Costa Rican skins of *Tangara larvata* may be separated at a glance into two series, all from the Caribbean slope falling into one, and those from the Pacific into the other. When compared with skins from British Honduras, the Caribbean birds are found to be identical with them, agreeing also with Mexican specimens, and must therefore be true *larvata* and not *larvata fanny*, as called by Mr. Ridgway. I should not say that they are typical *larvata*, because they are not, but are so much nearer that race that they may be distinguished from *fanny* at a glance. The birds doubtless intergrade in Costa Rica, several skins showing a tendency in that direction.

“A fair series of specimens in the postjuvenal moult (taken in August) shows that this moult is complete, including the wings and tail. In juvenal dress the remiges and rectrices are more brownish, and the edgings of the coverts and remiges are greenish rather than bluish.” (W. E. C. Todd.)

The bird is found over the whole of the Caribbean lowlands of the northern half of the country, and may also be present in the southern part, but there are no records for that section. Being a northern race I would suppose that it did not extend below Limon. It has been taken from near sea-level up to nearly 5,000 feet, but is most abundant between 500 and 2,000 feet.

684. *Tangara larvata fanny* (Lafresnaye).

*Aglaia fanny* LAFRESNAYE, Rev. Zool., 1847, 72 (Colombia; coll. Lafresnaye).

*Calliste larvata* (not of Du Bus) SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 274, *part* (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 124, *part*.—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 *part* (Trojas de Puntarenas and Pózo Azul de Pirrís).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893 (Boruca, Térraba, Buenos Aires).

*Calospiza larvata fanny* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 49, *part* (southern Honduras to northern Colombia).—BANGS, Auk, XXIV, 1907, 308 (Boruca and Paso Real de Térraba [Underwood]).

*Tangara* BRISSON, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Pígres (Zeledón), Pózo Azul de Pirrís (Underwood).

Bangs Collection: Pózo Azul de Pirrís, Buenos Aires, and El General de Térraba (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, Boruca, and Buenos Aires (Carriker), five skins; Pózo Azul de Pirrís (Underwood), twelve skins.

This bird may be easily distinguished from the eastern form by the characters given by Mr. Ridgway for the subspecies, *i. e.*, slightly smaller size, colors of head and sides paler, and greenish edgings to remiges, rectrices, and outer wing-coverts less distinct, sometimes wanting.

It is confined to the Pacific lowlands and foot-hills, and has thus far been taken only in the southwestern portion, from the Gulf of Nicoya southward; in fact there is no record that I can find for the taking of either form of *larvata* in Guanacaste or Nicoya. It is an abundant bird in the vicinity of Pózo Azul de Pirrís and throughout the Térraba Valley, associates in small flocks almost continually when not breeding, and is common in the outskirts of the Indian villages and around the edges of the savannas, in company with either *T. gyroloides* or the *Euphoniæ*, or both.

685. *Tangara dowii* (Salvin).

*Calliste dowii* SALVIN, P. Z. S., 1863, 168 (Rancho Redondo de Irazú, Costa Rica [J. M. Dow]; coll. Salvin and Godman?).—SCLATER, Ibis, 1863, 451, pl. 12 (San José, Costa Rica [Frantzus]).—LAWRENCE, Ann. Lyc. N. Y., IX,

1868, 98 (San José [Frantzus], Turrialba, and Navárrro [Cooper]).—FRANTZIUS, Jour. für Orn., 1869, 298 (Guadaloupe).—BOUCARD, P. Z. S., 1878, 54 (Navárrro).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Cartago and Rancho Redondo).

*Calliste dowi* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 272 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 124 (Irazú district [Rogers], Rancho Redondo [Dow], Navárrro [Cooper], Quebrada Honda [Zeledón]).

*Calospiza dowii* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 46 (Veragua and Costa Rica: San José, Rancho Redondo, Turrialba, Navárrro, Guadaloupe, Cartago, Irazú, Quebrada Honda).

*Tangara* Brisson, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Coliblanco (Ridgway and Zeledón), Lagunaria de Dota (Basulto), Irazú, and La Estrella de Cartago (from Mus. Nac. de C. R.).

Bangs Collection: Volcan de Irazú, La Estrella, and Azahar de Cartago (Underwood).

C. H. Lankester Collection: Vara Blanca.

Carnegie Museum: Escazú, La Hondura, Volcan de Turrialba (Carriker), twenty-eight skins; Escazú and La Estrella de Cartago (Underwood), two skins.

"Very little variation is observable in this series, all seeming to be in the adult plumage." (W. E. C. Todd.)

This is the only Costa Rican *Tangara* which is confined to the highlands and high mountains. Its range probably covers the whole of the higher portions of the country, although there are no records from southern Costa Rica, beyond the specimens taken at Lagunaria de Dota by Basulto. The lowest point at which it has been taken is La Hondura, which point being within the cold rainy Caribbean belt, is occupied by many forms not descending to such a low elevation at any other point. In the region of the central plateau it probably is not found below 6,000 feet, ranging from that altitude up to timber-line on the volcanoes de Irazú and Turrialba. Beyond the unusually high altitude at which the bird is found there is nothing particularly worthy of note in its habits.

#### 686. *Tangara lavinia lavinia* (Cassin).

*Calliste lavinia* CASSIN, Proc. Acad. Nat. Sci. Phila., X, 1858, 178 (Rio Truando, n. Colombia; coll. Acad. Nat. Sci. Phila.); 1860, 142, pl. 1, fig. 1 (do).—SCLATER, Ibis, 1876, 409 (Costa Rica).—Cat. Birds Brit. Mus., XI, 1886, 116 (Costa Rica [Van Patten]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Costa Rica).



*Calliste lavinia* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 271 (Costa Rican reference).

*Calospiza lavinia* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 46 (Nicaragua to Isthmus of Panama).

*Tangara* Brisson, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

Bangs Collection: Reventazón, one ♀, Jiménez, one ♂, La Vijagua, two ♂'s, Carrillo, two ♂'s (Underwood).

Carnegie Museum: Guápiles, one ♂ (Carriker & Crawford), Guápiles, one ♀, Carrillo, two ♂'s and one ♀ (Carriker).

This is the rarest of the Costa Rican species of *Tangara*, being found (thus far) only on the Caribbean lowlands of the northeastern section of the country, from the Reventazón River north to Nicaragua, just at the edge of the foot-hills and at an altitude of from 500 to 1,500 feet. The birds which I secured were taken in the rather open forest, feeding in the tops of the trees, and as far as I could tell were alone, not more than one bird having been taken or seen at the same spot. In this respect it is very different from all others of the genus, the others being decidedly gregarious.

#### 687. *Tangara gyroloides gyroloides* (Lafresnaye).

*Aglaia gyroloides* LAFRESNAYE, Rev. Zool., 1847, 277, *in text* (Central America).

*Calliste gyroloides* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Barránca, Guaitíl, and Dota [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 298 (Sabanilla de Pirrís, Guaitíl, Dota Mts., Barránca).—BOUCARD, P. Z. S., 1878, 54 (Navárro).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 270 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 117 (Guaitíl [Carmiol], Turrialba [Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Cartago, Naránjo de Cartago, Pózo Azul de Pirrís, Sarchí de Alajuela, and Los Anonos).—CHERRIE, Expl. en el Rio Naránjo, 1893, 13 (Pózo Pital and San Marcos); Expl. Zool. en C. R., 1891-2, 1893, 19 (Boruca, Térraba, Buenos Aires).

*Callispiza gyroloides* SALVADORI, Atti Roy. Ac. Torino, IV, 1868, 174 (Costa Rica).

*Calospiza gyroloides* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 43 (Upper Amazon to Costa Rica: Guaitíl, Turrialba, Barránca, Dota, Sabanilla de Pirrís, Navárro, Cartago, San Marcos, Sarchí de Alajuela, etc.).—BANGS, Auk, XXIV, 1907, 308 (Boruca, Barránca de Térraba [Underwood]).

*Tangara* Brisson, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Guayábo and Bonilla (Ridgway and Zeledón), Bonilla and Santa Maria de Dota (Basulto), Juan Viñas (Cooper) (Alfaro and Zeledón).

Bangs Collection: Carrillo, Cariblanco de Sarapiquí, El General de Térraba, Pózo Azul de Pirrís, and Puente de Tierra (Underwood).

Carnegie Museum: Carrillo, Boruca, Buenos Aires, Tucurríqui (Carriker), thirteen skins; Carrillo (Underwood), three skins.

This bird seems to range over nearly the whole of Costa Rica, having been taken on the Caribbean slope from 1,000 feet up to 3,000 feet, in the region of the central plateau and on the Pacific slope from the Gulf of Nicoya southward. It has not been found in Nicoya or Guanacaste, that region being rather too dry, with no humid forests. It is however very abundant in the Térraba Valley, in fact the only species of *Tangara* which is at all common, but on the Caribbean side it is the least abundant of all.

688. *Tangara guttata chrysophrys* (Sclater).

*Calliste chrysophrys* SCLATER, Jardine's Contr. Orn., 1851, 24, 54, pl. 69, fig. 2. (Venezuela; coll. P. L. Sclater).

*Calliste guttata* (not *Callispiza guttata* Cabanis) SCLATER, P. Z. S., 1856, 249, *part* (monogr.); Cat. Birds Brit. Mus., XI, 1886, 105, *part* (Tucurríqui [Arce], Angostura [Carmioll]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Angostura and Dota [Carmioll], Turrialba [Cooper]).—FRANTZIUS, Jour. für Orn., 1869, 298 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 268 (Tucurríqui [Arcé]; Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Turrialba).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 19 (Boruca).

*Calospiza guttata chrysophrys* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 40 (Costa Rica, southward through Colombia to Ecuador, Venezuela, and Trinidad).—Costa Rica: Tucurríqui, Angostura, Dota, and Turrialba).—BANGS, Auk, XXIV, 1907, 308 (Boruca and Barránca de Térraba [Underwood]).

*Tangara* Brisson, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón) (Basulto), Guayábo (Ridgway), Buena Vista (Castro and Fernandez).

Bangs Collection: Carrillo, El General de Térraba, Juan Viñas (Underwood).

Fleming Collection: Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Carrillo and Boruca (Carriker), twenty skins; Juan Viñas (Underwood), two skins.

"Some specimens are brighter, more yellowish-green above, being perhaps older birds. Females are fully as bright as males, and with just as much yellow on the head. The entire series differs decidedly from two specimens in the collection (of unknown origin) which evidently represent true *guttata*, in the respects mentioned by Salvin and Godman. It would

seem as if the yellowish-green wing-coverts, mentioned by Ridgway as indicating immaturity, characterize the juvenal plumage, as some individuals with greenish-blue coverts have soft skulls, and have evidently moulted into the first winter plumage." (W. E. C. Todd.)

The range of this handsome species covers the Caribbean foot-hills of the northeastern portion of the country and the southwestern Pacific region. It is probable that it will be found in the southeastern part of the country also, conditions being the same there. Thus far it has not been taken below 1,000 feet, and from that elevation up to 2,000. It is a much rarer bird in the Térraba Valley than on the eastern slope, where Carrillo seems to be the point of greatest abundance with this as well as with several other species of the genus.

689. **Tangara florida** (Sclater and Salvin).

*Calliste florida* SCLATER and SALVIN, P. Z. S., 1869, 416, pl. 28 (Costa Rica; coll. Salvin and Godman).—SALVIN, Ibis, 1870, 114 (Costa Rica).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 103, *part* (Costa Rica [Carmioli]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 267, *part*, pl. 17, fig. 1 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Costa Rica).

*Calospiza florida florida* RIDGWAY, Proc. Wash. Acad. Sci., III, 1901, 149, *in text*.—Birds N. and Mid. Amer., II, 1902, 39 (Costa Rica: Carrillo, on Rio Súcio).

*Tangara* Brisson, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón) (Basulto).

Bangs Collection: Carrillo (Underwood).

Carnegie Museum: Carrillo (Carriker), twenty-seven skins; Cariblanco de Sarapiquí and Carrillo (Underwood), three skins.

"The changes of plumage in this species correspond closely to those in *T. icterocephala*. Birds in juvenal dress are dull buffy-olive beneath; above greenish, black-streaked, the head slightly brighter, the rump more yellowish, the crown feathers black medially. The first winter plumage is green beneath, as in the adult (except the abdomen medially and the under tail-coverts); above with the black streaks more sharply defined, but with the head still greenish, the feathers each showing a V-shaped mark of black, the rump still dull yellowish-green. This plumage is retained throughout the first breeding season, and the bright yellow occiput and rump is not assumed until the first postnuptial moult. *Calospiza florida arcæi* of Ridgway, the type of which we have examined, was based

on a bird in the immature plumage above described, and the name must therefore be relegated to synonymy. Mr. Ridgway's material was very scanty." (W. E. C. Todd.)

This *Tangara* is confined in Costa Rica to the northeastern foot-hills of the Caribbean slope, from the Reventazón northward as far as the Sarapiquí River (so far as is now known), at an altitude of between 1,000 and 2,000 feet. It is most abundant in the gorge and along the slopes of the Rio Súcio, whence nearly all of the known specimens have come. It is most in evidence in August and September, feeding on a certain fruit there in company with *T. icterocephala* and several species of *Euphonia*.

690. ***Tangara icterocephala*** (Bonaparte).

*Calliste icterocephala* BONAPARTE, Compt. Rend., XXXII, 1851, 76 (Punta Playa, near Quito, Ecuador).—SCLATER, Jardine's Contr. to Orn., 1851, 53, pl. 70, fig. 1; Cat. Birds Brit. Mus., XI, 1886, 110 (Barránca, Dota, and San José [Carmioli], Turrialba [Arcé]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (San José and Barránca [J. Carmiol], Turrialba [Cooper], Dota [Frantzii]).—FRANTZIUS, Jour. für Orn., 1869, 298 (Candelaria Mts., Dota, Barránca, Turrialba).—BOUCARD, P. Z. S., 1878, 54 (Juan Viñas and Orósi).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 269 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Cartago, Juan Viñas, Santa Maria de Dota).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 19 (Boruca); An. Inst. Fis.-Geogr. Nac. de C. R., VI, 1893, 13 (San Marcos). *Callispiza icterocephala* SALVADORI, Atti Roy. Ac. Torino, IV, 1868, 175 (Costa Rica).

*Callispiza (Chrysothraupis) frantzii* CABANIS, Jour. für Orn., 1861, 87 (Costa Rica).

*Calliste frantzii* SCLATER, Ibis, 1863, 451 (Costa Rica); 1868, 72, *in text* (Costa Rica; crit.).

*Calospiza icterocephala* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 37 (Ecuador north to Costa Rica: San José, Dota, Turrialba, Barránca, Candelaria Mts., Juan Viñas, Orósi, San Marcos, Cartago).

*Tangara* Brisson, Ornithologia, III, 1760, 3, RICHMOND, Proc. U. S. Nat. Mus., XXXV, 1908, 644, footnote (critical).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledon), Carrillo and Naránjo (Cooper), El Copey, La Lagunaria, and Santa Maria de Dota (Basulto).

Bangs Collection: Carrillo, Cariblanco de Sarapiquí, La Estrella and Azahar de Cartago, San José, and La Vijagua (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Pózo Azul de Pirrís, Carrillo, La Hondura (Carricker), thirty-seven skins; Azahar de Cartago, Carrillo (Underwood), eight skins.

"Costa Rican specimens were originally described as *Callispiza frantzii* by Cabanis in 1861, but were referred to the Ecuadorean *C. icterocephala* by Dr. Sclater in 1868. Some of the adults in the present series are as small as those from Ecuador, measured by Ridgway, and as there are no observable differences in color, *C. frantzii* Cabanis cannot be recognized even as a subspecies.

"This fine series illustrates the plumage variation according to age to good advantage. Birds in the juvenal plumage are as described by Ridgway, *i. e.*, greenish with dark streaking above, including the crown; rump more yellowish, beneath yellowish with no trace of the pale silvery greenish of the adult. At the postjuvenal moult (August and September) this latter character is assumed and the crown becomes rather dark yellow, and the rump also becomes brighter yellow. In this plumage the bird passes the first breeding season, at the close of which there is a complete postnuptial moult, and the full adult plumage is assumed, in which the yellow color of the crown and rump is much deeper and brighter than before. Females seem to go through a corresponding cycle, but probably never become so bright as the males." (W. E. C. Todd.)

This species has a wide range, not only in Costa Rica, but elsewhere. It is found over the whole of the highlands and both the Caribbean and Pacific lowlands at certain seasons of the year (after the breeding season, in August and September), when it descends from the higher slopes to feed on fruit and berries ripening during that time. At this season it is very abundant around Carrillo, and it is at this point that most specimens of the species have been collected, not only by myself but by Underwood and others.

691. ***Buthraupis cæruleigularis*** Cherrie.

*Buthraupis cæruleigularis* CHERRIE, Proc. U. S. Nat. Mus., XVI, 1893, 609 (Buena Vista, San Carlos River, Costa Rica [Castro and Fernandez]; coll. U. S. Nat. Mus.).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 34 (Central Costa Rica: Buena Vista).

Bangs Collection: Carrillo, four specimens; Cariblanco de Sarapiquí, one ♂ (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Carrillo and La Hondura (Carriker). Seven skins.

"This series, with others since taken by Mr. Ridgway and Mr. Underwood, amply justifies the specific distinctness of this bird, known heretofore only from the type. It is apparently the northern representative

of *B. arcæi*, differing in having the sides and flanks uniformly and extensively dusky-bluish. Three birds of the above series are apparently adult, being much more brightly colored than the rest. They measure as follows:

				Wing.	Tail.	Culmen.
Car. Mus.	25794	♂ ad.	Carrillo, Aug. 17, 1905	91	48	15.5 mm.
Car. Mus.	25803	♂ ad.	" " 20 "	88	53	15.5 mm.
Car. Mus.	25841	♂ ad.	" " 22 "	91	51	16 mm.

None of these birds, however, show as distinct a blue color on the throat as on the crown. No. 25803 differs from all the others in having the yellow area of the chest flecked with black." (W. E. C. Todd.)

This is one of the rare tanagers of Central America, being confined (so far as now known) to the northeastern portion of Costa Rica, around the northeastern slopes of the Volcanoes Turrialba, Irazú, Barba, and Póas, from an altitude of about 1,000 feet up to 4,000 feet (Hondura). It is rare so high as La Hondura, but one specimen having been taken there. It is found only in the dense, tangled jungles of the rain-soaked Caribbean foot-hills, keeping near the ground in the most impenetrable parts of the undergrowth. I never heard the bird sing, but it has a tanager-like call, or note of alarm, resembling that of *Caryothraustes* or *Phænicothraupis*.

#### 692. *Euphonia gouldi* Sclater.

*Euphonia gouldi* SCLATER, 1857, 66, pl. 124 (Guatemala; coll. J. Gould); Cat. Birds Brit. Mus., XI, 1886, 81 (Angostura and La Valsa [Carmioll]).—FRANTZIUS, Jour. für Orn., 1869, 298 (Angostura, Pacuare, and Dota Mts.).—BOUCARD, P. Z. S., 1878, 54 (San Carlos).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 263 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Jiménez).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 29 (southern Mexico to Costa Rica: Angostura, Valsa, Tucurríqui, San Carlos, Jiménez, Pacuare, and Dota Mountains).

*Euphonia gouldii* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Angostura, Pacuare, and Dota [J. Carmioll]).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón) (Basulto), Guayábo (Ridgway and Zeledón), Jiménez (Verrill) (Alfaro).

Bangs Collection: Port Limon and La Vijagua (Underwood).

Fleming Collection: Reventazón (Underwood).

C. H. Lankester Collection: El Hogar, Jiménez.

Carnegie Museum: Guápiles (Carriker & Crawford), Guácimo, Rio Sicsola, Carrillo, El Hogar, and Peralta (Carriker). Ten skins.

This species is confined to the lowlands and lower slopes of the Carib-

bean, from sea-level up to about 2,000 feet, but more common below 1,000 feet. Frantzius gives the bird from the Dota Mountains, which record I am much inclined to doubt. There are no other references to the bird from the Pacific slope, and it is probable that an error was made with respect to the locality given on the label. This is the only Costa Rican species of the genus which lives entirely in the thick forest, only rarely being seen along the edges of the jungle. It keeps rather low down in the smaller trees and is more frequently met with in places where large trees are scattering, permitting a thick growth of low jungle. It does not associate in flocks so much as the other species of the genus, being very often met with singly or in pairs.

693. **Euphonia crassirostris** Sclater.

*Euphonia lanirostris* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 262, *part* (Angostura, Costa Rica).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 76, *part* (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 169 (Costa Rica).

*Phonasca lanirostris* CABANIS, Jour. für Orn., 1860, 331; 1861, 90 (Costa Rica).

*Euphonia crassirostris* SCLATER, P. Z. S., 1856, 277 (Santa Marta, Colombia; coll. P. L. Sclater).—BOUCARD, P. Z. S., 1878, 54 (Cartago).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 23 (Costa Rica to western Ecuador;—Costa Rica: Angostura and Cartago).

Bangs Collection: Corralillo, one female (Underwood).

Carnegie Museum: Boruca, one female (Carriker).

This is one of the rarest of the Costa Rican *Euphoniæ*, Costa Rica being to the north of the true range of the bird. It is a common bird in Panama, but in Costa Rica occurs in such small numbers that it is difficult to define its range. There is one record from the Caribbean slope at 2,000 feet, another from Cartago, near the continental divide, and three records from widely separated regions on the Pacific lowlands at altitudes varying from near sea-level to 2,000 feet. The specimen taken at Boruca was in company with *E. luteicapilla*, feeding on the berries of a variety of misletoe.

694. **Euphonia hirundinacea gnatho** (Cabanis).

*Euphonia hirundinacea* BONAPARTE, P. Z. S., 1837, 117 (Guatemala).

*Euphonia hirundinacea* (not of Bonaparte) CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 172 (Turrialba [Carmioli], San Juan [Frantzius]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Turrialba [Carmioli], San Juan [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 297 (San José).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 261 (Costa Rican references).—SCLATER,

Cat. Birds Brit. Mus., XI, 1886, 75 (Costa Rica [Endres, Carmiol, and Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (San José, Naránjo de Cartago, Navarro, Monte Redondo).—CHERRIE, Auk, IX, 1892, 24 (San José; descr. nest and eggs).—UNDERWOOD, Ibis, 1896, 435 (Miravalles).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 25, *part* (southern Mexico to Chiriquí (?) and Veragua (?);—Costa Rica: San José, Naránjo de Cartago, San Juan, Turrialba, etc.).

*Phonasca hirundinacea* CABANIS, Jour. für Orn., 1860, 334 (Costa Rica [Frantz]).

*Phonasca gnatho* CABANIS, Jour. für Orn., 1860, 335 (Costa Rica; coll. Berlin Museum).

*Euphonia gnatho* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Costa Rica).—FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 262 (Tempate de Nicoya [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 76 (Tempate and Turrialba [Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Costa Rica).—BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 37 (*E. hirundinacea* in Costa Rica equals *E. gnatho*; crit.).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Monte Redondo (Ridgway), Turrialba (Zeledón), Sabanilla de Alajuela (Alfaro).

Bangs Collection: Cartago, Bolson, Coralillo, Sabanilla (Underwood).

Carnegie Museum: Bebedero and Miravalles (Carriker). Five skins.

Mr. Bangs first suggested to me that *E. gnatho* (Cabanis) was probably the bird known in Costa Rica under the name of *E. hirundinacea*, and after carefully going over the subject Mr. Todd and I came to the same conclusion, the results of which are given by Mr. Todd below.

"Four adult males collected at Bebedero and Miravalles (May 2 to June 25, 1906), compared with four males of *E. hirundinacea* from British Honduras and Mexico exhibit the characters of this form to a striking degree. Not only is the bill larger and differently shaped, but the color of the upper part is bluer, less violaceous. The differences between this form and *E. hirundinacea*, while perfectly obvious to an unprejudiced eye, are of such a character that a trinomial designation seems preferable, unless, indeed, it can be shown that the two forms occur side by side without intergradation. The type locality is not known." (W. E. C. Todd.)

After examining the series in Mr. Bangs' collection I am positive that true *E. hirundinacea* does not occur in Costa Rica, and that all birds from that country are referable to this race.

This species inhabits the plateau region, occasionally straggling down to 2,500 feet on the Caribbean slope, and the whole of the Pacific slope and lowlands north of the Dota Mountains. It is found in company with *E. affinis* about Miravalles and other places in Guanacaste.



695. *Euphonia minuta humilis* (Cabanis).

*Phonasca humilis* CABANIS, Jour. für Orn., 1860, 334 (Costa Rica [Frantzius]; coll. Berlin Mus.).

*Acroleptes humilis* CABANIS, Jour. für Orn., 1861, 89 (Costa Rica; critical).

*Euphonia humilis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Costa Rica, *fide* Cabanis).—FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica).

*Euphonia minuta* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 258, *part* (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 71, *part* (Costa Rica [Van Patten]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (San José).—CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 531 (Costa Rica; crit.); Auk, IX, 1892, 25 (San José, not uncommon).

*Euphonia minuta humilis* RIDGWAY, Birds N. and Mid. Amer., II, 1902, 23 (Guatemala to Isthmus of Panama).—BANGS, Auk, XXIV, 1907, 308 (Boruca [Underwood]).

U. S. Nat. Museum: San José.

Bangs Collection: San José, Pózo Azul de Pirrís, Escazú, Volcan de Irazú (Underwood).

Carnegie Museum: Carrillo, San Miguel, San Sebastian, El Hogar, Boruca, and Pózo Azul de Pirrís (Carriker). Seventeen skins.

"The series examined indicates quite clearly that the fully adult plumage is not assumed until the first postnuptial moult, as in *E. luteicapilla* and probably other species of the genus." (W. E. C. Todd.)

This is the most abundant of the *Euphoniæ* on the Caribbean slope, although perhaps not so common as some other species of the Pacific. Its range covers practically the whole of the country from near sea-level up to about 5,000 feet, although it is not often seen below 700 feet on the Caribbean side. It is very probable that the birds breed in the plateau region and higher foot-hills, descending to the lowlands only after the young are able to take care of themselves.

696. *Euphonia luteicapilla* (Cabanis).

*Phonasca luteicapilla* CABANIS, Jour. für Orn., 1860, 332 (Costa Rica [Frantzius]).

*Euphonia luteicapilla* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (Costa Rica).

—FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 260, pl. 16, fig. 1 (Turrialba [Arcé]; C. R. references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 68 (Turrialba [Carmioli]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (San José, Las Trojas de Puntarenas, Pacaca, Monte Redondo).—CHERRIE, Auk, IX, 1892, 24 (San José; plumage of young male); Expl. Zool. en C. R., 1891-2, 1893, 18 (Lagarto, Boruca, Térraba, Buenos Aires).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 20 (Nicaragua to Isthmus of Panama).—BANGS, Auk, XXIV, 1907, 308 (Boruca and Paso Real de Térraba [Underwood]).

*Acroleptes luteicapillus* CABANIS, Jour. für Orn., 1861, 91, *in text*.

U. S. Nat. Museum: Pígres (Zeledón), Bonilla (Ridgway, Zeledón and Alfaro), Alajuéla, and San José (Alfaro).

Bangs Collection: San José, El General and Buenos Aires de Térraba, Tenorio (Underwood).

Carnegie Museum: Miravalles, Buenos Aires, Boruca, El Hogar, and Peralta (Carriker). Twenty skins.

"Doubtless this species breeds in the immature (first winter) plumage, as is shown by specimens from Miravalles taken May 30, which are assuming the fully adult dress by a complete postnuptial moult." (W. E. C. Todd.)

Excepting only *Euphonia minuta humilis*, this is the commonest and most widely distributed of the *Euphonia* in Costa Rica. It is found over the plateau region, the whole of the Pacific slope and the Caribbean slope down to the foot-hills, even descending into the lowlands in December and January. It is most abundant on the Pacific slope at an elevation of about 1,000 to 1,500 feet. It is found more in the open woodland and scattering trees such as are found along roadsides and river banks. It is very fond of the berries of the mistletoe, locally known as "Matapalo." It has a weak musical note, very hard to locate.

#### 697. *Euphonia affinis* (Lesson).

*Tanagra (Euphonia) affinis* Lesson, Rev. Zool., 1842, 175 (Realejo, Nicaragua).

*Euphonia affinis* BONAPARTE, Consp. Av., I, 1850, 233.—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (San Juan [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 257 (Costa Rican references).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 65 (no C. R. specimens).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Liberia and Alajuéla).—UNDERWOOD, Ibis, 1896, 435 (Miravalles).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 21 (southeastern Mexico to Costa Rica: San Juan, Liberia, and Alajuéla).

*Phonasca affinis* CABANIS, Jour. für Orn., 1860, 332 (San José [Hoffmann]; Costa Rica [Frantzius]).

*Acroleptes affinis* CABANIS, Jour. für Orn., 1861, 91, *in text*.

U. S. Nat. Museum: Pígres (Ridgway and Zeledón).

Bangs Collection: Miravalles, Bolson, and Tenorio (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Bebedéro and Miravalles (Carriker). Six skins.

*Euphonia affinis* seems to be confined to the northwestern Pacific slope and to the portion of the central plateau region draining into the Pacific ocean. There are no records for its presence south of the Gulf of Nicoya

or south of the valley of San José. It seems to be most abundant in Guanacaste, in the vicinity of Miravalles, Tenorio, Bolson, and Bebedero, where several collectors have taken it in considerable numbers. In habits and habitat it much resembles *E. luteicapilla* and *E. olivacea humilis*.

698. **Euphonia gracilis** (Cabanis).

*Phonasca gracilis* CABANIS, Jour. für Orn., 1860, 333 (San José, Costa Rica [Hoffmann]; coll. Berlin Museum).

*Euphonia gracilis* SCLATER, Cat. Am. Birds, 1862, 359 (Costa Rica).—Cat. Birds Brit. Mus., XI, 1886, 69 (Costa Rica [Hoffmann]).—CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 169 (Costa Rica [J. Carmiol]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (San José [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 259, pl. 16, fig. 3 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Pózo Azul de Pirris).—CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 530 (Pózo Azul de Pirris [Zeledón]); Auk, IX, 1892, 24 (San José; ♂ in full song taken Dec. 30, with no signs of having been in a cage; home of bird in extreme southwestern Costa Rica); Expl. Zool. en C. R., 1891-2, 1893, 18 (Boruca).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 19 (Chiriquí and Costa Rica: San José and Pózo Azul de Pirris).—BANGS, Auk, XXIV, 1907, 308 (Boruca, Paso Real, and Barranca de Térraba [Underwood]).

*Acroleptes gracilis* CABANIS, Jour. für Orn., 1861, 91, *in text*.

*Euphonia fulvicrissa* CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 169 (Angostura and Pacuare).

U. S. Nat. Museum: Pózo Azul de Pirris.

Bangs Collection: El General de Térraba and Pózo Azul de Pirris (Underwood).

Fleming Collection: Miravalles (Underwood).

This species seems to be confined strictly to the Pacific lowlands and foot-hills, but is not a common bird, few specimens having been taken in Costa Rica. With the exception of a single record (Volcan de Miravalles), all specimens have been taken either at Pózo Azul de Pirris or in the Térraba Valley. Underwood secured nine specimens at Boruca, but I did not find the bird either there or at any other point in the Térraba Valley, so that it certainly cannot be a very common species. The single specimen which Cherrie reports from San José is accidental to say the least, and may probably be an escaped cage bird.

699. **Euphonia anneæ** Cassin.

*Euphonia anneæ* CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 172 (Santa Rosa, Costa Rica [J. Carmiol]; coll. U. S. Nat. Mus.).—LAWRENCE, Ann. Lyc.

N. Y., IX, 1868, 98 (Angostura and Santa Rosa [J. Carmiol]).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 17 (Veragua and Costa Rica: Angostura, Turrialba, Naránjo de Cartago, Santa Rosa, Rio Súcio).

*Euphonia annæ* FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 265 (Turrialba [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 72 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Naránjo de Cartago and Rio Súcio).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway) (Basulto).

Bangs Collection: La Vijagua, Carrillo, Cariblanco de Sarapiquí (Underwood).

Carnegie Museum: Volcan de Turrialba, Carrillo, La Hondura, Las Mesas (Carriker), Carrillo, and Cariblanco de Sarapiquí (Underwood). Fourteen skins.

"As noted in the British Museum Catalogue, the adult female always has a very decided gray nuchal band. Mr. Ridgway, however, omits reference to this in his description, and his key is therefore misleading to that extent, throwing this species into the wrong section. Evidently he had an immature bird in hand, which did not show this pattern. Several male birds taken in August and September exhibit various stages of the moult into the fully adult dress." (W. E. C. Todd.)

This *Euphonia* is confined to the Caribbean watershed, from about 1,200 feet up to near timber-line on the eastern and northern slopes of the high volcanoes. It is usually found in the heavy forest, rather than in open woodland or scattering trees. It is often found feeding in company with *Tangara icterocephala* and *florida*, and is fairly abundant about Carrillo and La Hondura in the Rio Súcio gorge during August and September.

#### 700. *Euphonia elegantissima* (Bonaparte).

*Pipra elegantissima* BONAPARTE, P. Z. S., 1837, 112 (Mexico).

*Euphonia elegantissima* GRAY, Gen. Birds, App., 1849, 17.—CABANIS, Jour. für Orn., 1860, 332 (Costa Rica [Frantzius and Hoffmann]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 98 (San José [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 297 (Costa Rica).—BOUCARD, P. Z. S., 1878, 54 (San José; habits and song).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 257 (Irazú [Arcé and Rogers], Turrialba [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 62 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (Cartago and San José).—CHERRIE, Auk, IX, 1892, 24 (San José; descr. abnormally colored male).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 12 (southern Mexico to Veragua).

U. S. Nat. Museum: Guayábo and Volcan de Turrialba (Ridgway and Zeledón), Santa Maria de Dota (Basulto), San José, La Estrella, and Volcan de Irazú.

Bangs Collection: Carrillo and Azahar de Cartago (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Escazú, Volcan de Turrialba, San Miguel (Carriker), Azahar de Cartago, and La Estrella de Cartago (Underwood). Eleven skins.

"An immature female (26618, San Miguel, Oct. 23, 1905) shows a few blue-tipped feathers on the otherwise dull greenish crown, also a few ochraceous feathers on the throat. Another specimen (lacking data) has a dull blue crown, but no trace of ochraceous on the throat, which is merely slightly brighter yellowish than the breast." (W. E. C. Todd.)

This species breeds and is resident most of the year in the plateau region and the high mountains of the interior, descending to the lower Caribbean slopes and foot-hills during the late summer months. It frequents scattering trees and open woodland more than heavy virgin forest, and is a very sweet singer, thriving well in captivity. With the exception of two or three species, the Euphonias are not abundant birds, and are seldom seen unless feeding on some favorite fruit.

Sclater describes eggs of this species taken by Boucard in the State of Oaxaca, Mexico, as follows: "Eggs of this bird taken at Juquila in Oaxaca in May are rounded in shape, and of a creamy-white with a few scattered spots and blotches, principally at the larger end, of two shades of brown. They measure .65×.50 inches. They are the first authentic specimens of the eggs of any of the Euphonias that I have seen."

#### 701. *Chlorophonia callophrys* (Cabanis).

*Triglyphidia callophrys* CABANIS, Jour. für Orn., 1860, 331 (Costa Rica [Hoffmann]).

*Acrocompsa callophrys* CABANIS, Jour. für Orn., 1861, 88.

*Chlorophonia callophrys* LAWRENCE, Ann. Lyc. N. Y., IX, 98 (Rancho Redondo [F. Carmiol], San José [Frantzius], Birris [Zeledón]).—FRANTZIUS, Jour. für Orn., 1869, 297 (Rancho Redondo, Cervantes, Candelaria).—BOUCARD, P. Z. S., 1878, 54 (Navarro and La Candelaria).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1883, 254 (Irazú [Rogers]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 58 (Costa Rican references).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 109 (San José, Cartago, Alajuela, Rancho Redondo, and Naranjo de Cartago).—RIDGWAY, Birds N. and Mid. Amer., II, 1902, 7 (highlands of Veragua to Costa Rica: Birris, Rancho Redondo, San José, Cervantes, La Candelaria, Navarro, and Irazú).

*Chlorophonia calophrys* SCLATER and SALVIN, Exotic Orn., 1868, 84, pl. 68, ♂ and ♀.

U. S. Nat. Museum: Bonilla, El Rey, Las Lagunaria, and Las Vueltas de Dota (Basulto), Coliblanco (Ridgway and Zeledón), Irazú, and Jiménez (Verrill).

Bangs Collection: Escazú, La Estrella de Cartago, vicinity of San José, Azahar de Cartago, Volcan de Irazú (Underwood).

Carnegie Museum: Volcan de Irazú, Escazú, Carrillo, La Hondura (Carriker). Twenty-four skins.

"In the series taken during the fall there is only one adult male, the remainder being either adult females or birds in first winter plumage. It is not clear how long this latter dress is worn, but it is probable that it persists through the first breeding season. One specimen (25750) from Carrillo, August 14, 1905, is emerging from the juvenal plumage, which is dull olive-yellowish below, quite different from the next stage." (W. E. C. Todd.)

This bird ranges over the whole of the central plateau from 3,000 to 8,000 feet. It is inclined to be gregarious when not breeding, and is found only in the heavy virgin forest, usually at a considerable height from the ground. It has a weak, rather musical note, which is often repeated while feeding or moving through the tree-tops. Males in full plumage are not common, the birds probably not attaining the adult phase until the second or third year. When fruit is scarce at high altitudes it frequently descends as low as 1,200 feet, specimens having been taken at Carrillo in August, at La Hondura in September, on Irazú at 8,000 feet in April, and at Ujurrás de Térraba at 7,000 feet in September.

#### Family FRINGILLIDÆ.

##### 702. *Saltator striatipectus isthmicus* (Sclater).

*Saltator isthmicus* SCLATER, Proc. Zool. Soc. Lond., 1861, 130 (Panama; coll. P. L. Sclater).

*Saltator albicollis* CHERRIE, Expl. Zool. en Costa Rica, 1891-2, 26 (Boruca, Térraba, and Lagarto de Térraba).

*Saltator albicollis isthmicus* BANGS, Auk, XXIV, 1907, 311 (Boruca and Lagarto de Térraba [Underwood]).

*Saltator striatipectus isthmicus* HELLMAYR, Nov. Zool., XIII, 1906, 306 (crit.).

Bangs Collection: El General de Térraba (Underwood).

Carnegie Museum: Boruca and Buenos Aires de Térraba (Carriker). Six skins.

"These specimens are decidedly more greenish than examples of *S. striatipectus* from Colombia. As shown by Hellmayr (Nov. Zool., XIII, 1906, 315) *Saltator albicollis* of Vieillot is equivalent to *Saltator guadelupensis* of Lafresnaye, and hence *Saltator striatipectus*, also of the latter author, becomes the proper specific designation for this bird." (W. E. C. Todd.)

This species is found in the Térraba Valley from Boruca to El General, but is not abundant anywhere in its Costa Rican range. It occurs almost exclusively in the second-growth thickets grown up in the old Indian clearings commonly met with in this region. It is very quiet, but not excessively shy, is seen only singly or in pairs, and, like the other members of the genus, subsists almost entirely upon fruits and berries.

703. ***Saltator grandis*** (Lichtenstein).

*Tanagra grandis* LICHTENSTEIN, Preis-Verz. Mex. Vog., 1831, 2 (Mexico; see Jour. für Orn., 1863, 57).

*Saltator grandis* CABANIS, Jour. für Orn., 1860, 416 (Costa Rica [Frantzius and Hoffmann]); 1861, 1 (do).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (San José [Frantzius], Cartago [Cooper]).—FRANTZIUS, Jour. für Orn., 1869, 300 (C. R.).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (San José).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 328 (San José [Frantzius], Cartago [Cooper, Arcé, and Rogers], Tempâte [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 288 (Irazú [Rogers], San José [Carmioll], Tempâte, and Volcan de Cartago [Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Alajuela, Cartago, Naránjo, and San José).—CHERRIE, Auk, IX, 1892, 27 (abundant about San José, but not found at lower altitudes; descr. of nest and eggs).—RIDGWAY, Birds of North and Mid. Amer., I, 1901, 666 (south-eastern Mexico, southward to Costa Rica [San José, Cartago, Tempâte, Alajuela, Naránjo]).

U. S. Nat. Museum: Alajuela (Alfaro), San José (Cherrie).

Am. Mus. Nat. History: San José (Underwood).

Bangs Collection: San José, Carrillo, and Corallillo (Underwood).

C. H. Lankester Collection: San José.

Carnegie Museum: Tierra Blanca, Juan Viñas, San José (Carriker). Five skins.

"An immature bird (25430) from San José, Oct. 20, in the plumage described as *S. icterophrys*, is decidedly streaked below. Another immature example (28228) taken at Juan Viñas on May 10, is more worn, so that the streaking is scarcely perceptible." (W. E. C. Todd.)

The range of this bird extends over the central plateau and down the eastern slope to approximately 2,500 feet, although an occasional straggler

is found at a lower altitude, the lowest being a single specimen from Carrillo, while Tierra Blanca seems to be the highest point from which we have a record. Sclater records a specimen from Tempáte (Gulf of Nicoya), which seems rather doubtful. I have never seen it in that region, neither are there other records.

It is not an abundant bird in any locality I visited. It is quiet, but not shy, much less gregarious than the other species of the genus, and is usually found in thick second-growth or among bushes and thickets in open pastures.

704. *Saltator intermedius* Lawrence.

*Saltator intermedius* LAWRENCE, Proc. Acad. Nat. Sci. Phila., 1864, 106.

*Saltator magnoides* CHERRIE, Expl. Zool. en Costa Rica, 1891-2, 1893, 26 (Lagarto, Boruca, and Buenos Aires).

*Saltator magnoides intermedius* RIDGWAY, Birds N. and Mid. Amer., I, 1901, 665 (Isthmus of Panama and Chiriquí).—BANGS, Auk, XXIV, 1907, 311 (Boruca, El Pózo, Barranca de Térraba, Barranca de Puntarenas [Underwood]).

U. S. Nat. Museum: Pózo Azul de Pirrís (Underwood).

Bangs Collection: El General and Buenos Aires de Térraba (Underwood).

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Térraba, Boruca, Buenos Aires (Carriker). Thirteen skins.

"This form is apparently specifically distinct from *Saltator magnoides medianus*; at any rate there are certainly no intermediates in the series examined. Moreover, the latter is found at Esparta, while Mr. Bangs records a specimen of the present form from Barranca de Puntarenas, so that their respective ranges approach very closely, if they do not actually overlap. *S. intermedius* is a very different looking bird, and its haunts and habits are said to be different also. As stated by Mr. Bangs, all specimens show complete pectoral bands. Although actual measurements fail to show adequately the difference in size, there is a very pronounced difference, perfectly obvious when a series is compared, the present form being much the smaller. It is perhaps best shown by a comparison of the total lengths (taken in the flesh) of the two forms, *intermedius* averaging about ten millimeters less. (Cf. Salvin, P. Z. S., 1867, 140.)

"Several specimens are immature, with light colored mandibles and indication of spots below the pectoral band—the remains of the juvenal plumage." (W. E. C. Todd.)

Common throughout the Térraba Valley and as far up the coast as Pózo Azul de Pirrís, where, however, it is quite rare. In this region it seems to



have entirely supplanted *S. magnoides medianus*, from which it differs in its habits in being much less gregarious, less noisy, and in being found more frequently in the woodland.

705. ***Saltator magnoides medianus*** Ridgway.

*Saltator magnoides* (not of Lafresnaye) CABANIS, Jour. für Orn., 1860, 416, (C. R. [Frantzius and Ellendorf]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (Turrialba [F. Carmiol], San José, and Angostura [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 300 (C. R.).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (San José and Cartago).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 327 (Turrialba and Bebedéro [Arcé], Irazú [Rogers], San José, and Angostura [Carmiol]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 284 (Irazú [Rogers], Turrialba, Bebedéro, and Nicoya [Arcé]).—CHERRIE, Auk, IX, 1892, 27 (widely distributed through C. R., on both coasts and to an elevation of 6,000 ft.).—UNDERWOOD, Ibis, 1896, 436 (Miravalles to Bebedéro).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887. 111 (Jiménez, Cartago, San José, Naránjo de Cartago, Alajuela, and Trojas de Puntarenas).

*Saltator magnoides medianus* RIDGWAY, Birds of North and Mid. Amer., I, 1901, 664 (Guatemala to Costa Rica).

U. S. Nat. Museum: Bonilla (Basulto) (Ridgway), Volcan de Turrialba (Ridgway), Carrillo (Underwood).

Acad. Nat. Sci. Philadelphia: Aguacate Mountains and Monte Redondo (Underwood).

Bangs Collection: Los Cuádro de Irazú, Cariblanco de Sarapiquí, Carrillo (Underwood).

Carnegie Museum: El Hogar, Juan Viñas, Esparta, Guácimo, Carrillo, (Carriker), Guápiles (Carriker & Crawford), Carrillo, Tucurríqui, San Sebastian (Underwood). Sixteen specimens.

"There is a great deal of variation, apparently individual, in the width of the black pectoral crescent, and in the depth and extent of the olive tinge on the crown. A bird from Carrillo (25861), August 24, 1905, is in juvenal plumage. It is uniform dull olive-green above, below greenish-white, indistinctly clouded with dusky olive, the sides darker, the under tail-coverts buffy-ochraceous; pectoral collar and sides of the throat dull black, enclosing a small whitish spot; superciliary line yellowish-white; mandible pale." (W. E. C. Todd.)

This is the commonest species of *Saltator* in Costa Rica, found both on the northern portion of the Pacific and over the whole of the Caribbean lowlands, and up over the central plateau to an altitude of approximately 5,000 feet, although not common above 4,000 feet. It is usually to be seen in small flocks, is very noisy and rather shy, frequenting shrubbery

and open woodland, and seems to subsist largely, if not entirely, upon fruits and berries.

706. ***Saltator atriceps atriceps* Lesson.**

*Tanagra* (*Saltator*) *atriceps* LESSON, Cent. Zool., 1830, 208, pl. 69 (Mexico; Paris Mus.).

*Saltator atriceps* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102, *part* (Pacuare [J. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 325, *part* (Pacuare [Carmiol]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 283, *part* (Costa Rica [Carmiol]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111, *part* (Narânjo).

*Saltator atriceps atriceps* RIDGWAY, Birds of North and Mid. Amer., I, 1901, 661 (southern Mexico and south into Costa Rica).

Carnegie Museum: El Hogar, Dec. 13, 1905 (Carriker).

"A single specimen (26710) from El Hogar, while not quite typical, must be referred to this form, agreeing with birds from British Honduras in the presence of a broad pectoral band, although the auriculars are not quite so black." (W. E. C. Todd.)

*S. atriceps* is quite rare at so low an altitude as El Hogar, and of the two specimens taken there, one is referable to each of the subspecies. That the two forms overlap in Costa Rica there can thus be no doubt. Their habits appear to be the same.

707. ***Saltator atriceps lacertosus* (Bangs).**

*Saltator atriceps* (not of Lesson) LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102, *part* (Pacuare [J. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 325, *part* (Pacuare [J. Carmiol]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 283, *part* (Costa Rica).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111, *part* (Narânjo de Cartago).

*Saltator lacertosus* BANGS, Proc. New Eng. Zool. Club, II, 1901, 31 (Loma del Leon, Panama).

*Saltator atriceps lacertosus* RIDGWAY, Birds N. and Mid. Amer., I, 1901, 663 (Isthmus of Panama to Costa Rica: Talamanca).

U. S. Nat. Museum: Jiménez (Alfaro and Carranza), Narânjo (Cooper) (from Mus. Nac. de C. R.), Guayábo (Ridgway and Zeledón).

Bangs Collection: Jiménez (Underwood).

Carnegie Museum: Juan Viñas, El Hogar (Carriker).

"The El Hogar specimen is perfectly typical of this, the southern form. In a bird from Juan Viñas (28151) the pectoral collar is strongly indicated, but the auriculars are clear gray." (W. E. C. Todd.)

This is the common Costa Rican form of *S. atriceps*, ranging over the higher portion of the "tierra caliente" of the Caribbean and upwards.

Of the four specimens taken (one at El Hogar and three at Juan Viñas) but one of the birds from Juan Viñas shows any signs of a jugular collar, and all have the sides of the head and foreneck clear gray. These birds frequent wooded pastures, edges of forests, coffee-plantations and shrubbery. They are very gregarious, and are almost always seen in flocks of from four to eight or ten, are very noisy, and are exceedingly shy and hard to approach. The note is rather harsh and loud, but with a slight musical quality lacking in the other Costa Rican species of the genus.

708. **Caryothraustes poliogaster poliogaster** (Du Bus).

*Pitylus poliogaster* DU BUS, Bull. Ac. Roy. Belg., XIV, pt. 2, 1847, 105 (Guatemala; Brussels Museum).

Carnegie Museum: Carrillo, Aug. 23, 1905, two specimens (Carriker), Nov. 17, 1898, one ♂ (Underwood). Three skins.

"Three specimens from Carrillo must be referred to this form, agreeing well with British Honduras birds both in color and measurements, and differing thus from other individuals taken at the same time and place. They are, however, somewhat brighter yellow underneath than the birds from British Honduras." (W. E. C. Todd.)

Mr. Ridgway states (Birds of North and Middle America) that this form does not extend south of Honduras, but the specimens above cited show that the ranges of the two forms overlap for some distance. Thus far the present variety has been taken only at Carrillo, in northeastern Costa Rica. The bird is a denizen of the thick forests of the Caribbean slope at an altitude of from 800 to 2,000 feet, but is not abundant. It is usually seen in small flocks in company with other finches and tanagers which frequent such localities. It is rather quiet, keeping low down, being often flushed from the ground, and is never seen in high trees or in the open forests. (The above remarks really refer more to the following subspecies than to the present.)

709. **Caryothraustes poliogaster scapularis** (Ridgway).

*Pitylus poliogaster* (not of Du Bus) SCLATER and SALVIN, Proc. Zool. Soc. Lond., 1864, 352 (Lion Hill, Panama Railroad).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (Angostura [J. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 333, *part* (Angostura [Carmiol], Tucurríqui [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 307, *part* (Tucurríqui [Arcé]).  
*P[itylus] poliogaster* SCLATER and SALVIN, Exotic Orn., pt. XI, 1869, 168 (C. R.).  
*Pitylus poliogaster scapularis* RIDGWAY, Proc. U. S. Nat. Mus., X, Aug. 6, 1888, 586 (eastern Nicaragua).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111

(Angostura).—RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 491 (Rio Frio, common).

*Caryothraustes poliogaster scapularis*. RIDGWAY, Birds of North and Mid. Amer., I, 1901, 656 (southern Honduras to Isthmus of Panama).

U. S. Nat. Museum: Bonilla (Ridgway), Pacuarito (Cherrie), Jiménez (Verrill).

Bangs Collection: La Vijagua, Carrillo (Underwood).

Carnegie Museum: Carrillo and El Hogár (Carriker), Carrillo and Pacuarito (Underwood). Five skins.

"Birds from Bonilla, collected by Mr. Ridgway, although more or less intermediate, are to be referred to this form." (W. E. C. Todd.)

Found along the whole of the Caribbean watershed between 800 and 2,000 feet, but rarely met with in southern Costa Rica, being more abundant from the Rio Reventazón northward. Its habits are the same as those of the preceding species.

#### 710. *Pitylus grossus* (Linnæus).

[*Loxia*] *grossa* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 307 ("America"; based on *Coccothraustes americana cærulea* BRISSON, Orn., App., 89, pl. 5, fig. 1).

*Pitylus grossus* SCLATER, Cat. Birds Brit. Mus., XI, 1886, 303 (Valsa [Carmioli], Tucurrique [Arcé]).—CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 170 (Pacuare [J. Carmiol]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (Payua [J. Carmiol]).—ZELEDÓN, Cat. Aves de C. R., 1882, 8; An. Mus. Nac. de C. R., I, 1887, 111 (Jiménez and Pacuare).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 331 (Pacuare and Valsa [Carmioli]).—RIDGWAY, Birds North and Mid. Amer., I, 1901, 652 (Nicaragua to British Guiana, Cayenne, eastern Brazil, eastern and central Peru, and western Ecuador).

U. S. Nat. Museum: Carrillo (Underwood).

Bangs Collection: Carrillo and Jiménez (Underwood).

C. H. Lankester Collection: La Florida.

Carnegie Museum: Guápiles, Guácimo, El Hogár, and Rio Sicsola (Carriker). Seven skins.

Found very sparingly along the whole Caribbean watershed at an elevation of from 500 to 1,000 feet. It frequents only the heavy forest, is not gregarious and is rarely met with. The male sings at the beginning of the breeding season, the note somewhat resembling that of the Cardinal. No nests were seen.

#### 711. *Pheucticus tibialis* Baird.

*Pheucticus tibialis* "Baird, MS." LAWRENCE, Ann. Lyc. N. Y., VIII, May, 1867, 478 (Cervantes [J. Cooper]; coll. U. S. Nat. Mus.); IX, 1868, 102 (Tucurrique

and Cervántes [J. Carmiol], San José [Frantzius], Rancho Redondo [F. Carmiol], Cervántes [Cooper]).—SALVADORI, Atti. R. Accad. Torino, IV, 1869, 177, pl. 5 (Costa Rica).—FRANTZIUS, Jour. für Orn., 1869, 300 (Turrialba).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 58 (Navárrro and Volcan de Irazú).—ZELEDÓN, Cat. Aves de C. R., 1882, 8; An. Mus. Nac. de C. R., I, 1887, 111 (Rancho Redondo, El Zarcéro de Alajuela, Cartago, etc.).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 335 (Cervántes [J. Cooper and Carmiol], Tucurríqui and Rancho Redondo [Carmiol], San José and Turrialba [Frantzius]).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 53 (Irazú district [Rogers], Rancho Redondo [F. Carmiol], Valsa [J. Carmiol]).—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 495 (Irazú).—RIDGWAY, Birds of North and Mid. Amer., I, 1901, 623 (highlands of Costa Rica: Cervántes, Tucurríqui, San José, Rancho Redondo, Turrialba, Navárrro, Irazú, etc., and Veragua).

U. S. Nat. Museum: Volcan de Turrialba, Coliblanco, and Bonilla (Ridgway & Zeledón), La Estrella, Irazú, and Tres Rios.

Bangs Collection: Azahar and La Estrella de Cartago (Underwood).

C. H. Lankester Collection: Cariblanco de Sarapiquí.

Carnegie Museum: Volcan de Irazú (Carriker), Azahár de Cartago (Underwood). Five skins.

This bird is found quite commonly on the southern exposure of the Volcan de Irazú, less so on the slopes of the Volcan de Turrialba and on the eastern watershed as low as 2,500 feet. It is probable that like many other species it only descends to low altitudes in search of food, breeding at from 5,000 or 6,000 feet above sea-level. It is not found in the thick forests, preferring the edges of the woodland and isolated trees scattered about in fields and pastures. It is a fine songster, its song resembling that of *Zamelodia* and *Guiraca*.

A single nest was found on April 18, 1902, containing two slightly incubated eggs. The nest was rather bulky for a grosbeak, having a thick foundation of twigs with the usual frail structure of rootlets on top. The nest was placed in a small tree in a partially cleared spot.

The eggs are pale blue, with scattering markings of purplish-lilac, overlaid with dots and blotches of dull chestnut-brown, forming, together with the lilac markings, a heavy wreath about the larger end. Measurements:  $30 \times 21$ ;  $30 \times 21.5$  mm.

## 712. *Zamelodia ludoviciana* (Linnæus).

*Loxia ludoviciana* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 306.

*Hedymeles ludoviciana* CABANIS, Jour. für Orn., 1861, 7 (Costa Rica [Frantzius]).

*Hedymeles ludovicianus* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (San José [J. Carmiol], La Palma [Zeledón]).—FRANTZIUS, Jour. für Orn., 1869, 300

(San José, Feb. to June).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 336 (C. R. [Frantzius], San José and Angostura [Carmioli], La Palma [Zeledón], Cachí [Rogers]).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.—BOUCARD, Proc. Zool. Soc. Lond., 1878, 58 (San José, 1 spec.).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 58 (Cachí [Rogers], San José, and Angostura [F. Carmioli]).

*Habia ludoviciana* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Cartago).—CHERRIE, Auk, VII, 1890, 334 (San José, Oct. 23 to Feb. 3); Auk, IX, 1892, 27 (San José; rare).

*Zamelodia ludoviciana* COUES, B. N. O. C., V, 1880, 98, *in text*.—RIDGWAY, Birds of North and Mid. Amer., I, 1901, 614 (eastern U. S. and more southern British Provinces, west to edge of Great Plains; in winter south to the Bahamas, Cuba, Jamaica, and through Mexico (both sides) and Central America to western Ecuador and Santa Marta, Colombia).

U. S. Nat. Museum: Guayábo, March 7 (Ridgway and Zeledón), Santo Domingo de San Mateo, Feb. (Alfaro).

Bangs Collection: Escazú, August 29, 1905 (Underwood).

Fleming Collection: Azahar de Cartago, Feb. 10, 1899 (Underwood).

C. H. Lankester Collection: Tres Rios.

Carnegie Museum: Escazú, August 13, La Honduras, Sept. 28, El Hogar, March 21 (Carriker), Tucurriquí, Dec. 10 (Underwood). Four skins.

"A bird from Escazú, taken at a remarkably early date, August 13 (1902), seems to be entering on the postjuvenile moult, the greater and some of the lesser coverts having already been replaced by black feathers. In another bird (La Honduras, Sept. 28, 1905) the lesser and inner coverts have been renewed and there is somewhat more pink on the breast. A bird from El Hogar, March 21, 1907, is in perfect spring dress." (W. E. C. Todd.)

Not uncommon as a winter visitor throughout the plateau region, less frequent on the Caribbean slope.

### 713. *Guiraca cærulea lazula* (Lesson).

*Pitylus lazulus* LESSON, Rev. Zool., V, 1842, 174.

*Guiraca cærulea* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (Angostura [J. Carmioli]).—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—ZELEDÓN, Cat. Aves de C. R., 1882, 8; An. Mus. Nac. de C. R., I, 1887, 111.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1885, 344, *part* (C. R. [Frantzius], Angostura [Carmioli]).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 28 (Boruca, 1 spec., Nov. 29).—UNDERWOOD, Ibis, 1896, 436 (Miravalles).

*Guiraca cærulea lazula* RIDGWAY, Auk, XV, Oct. 1898, 322 (crit. nomencl.).—RIDGWAY, Birds of North and Mid. Amer., I, 1901, 610 (southwestern portion of the U. S. and Mexican Plateau; in winter, middle and southern Mexico, and south through Central America to southern Costa Rica).

U. S. Nat. Museum: Coyolar (Alfaro), February, 1905.

Carnegie Museum: Puntarenas, June 8, 1907 (Carriker). . One skin.

"Represented in the collection by a single bird (28303) from Puntarenas. It would seem to be a male of the previous year, but has evidently failed to moult properly, showing only a few blue feathers about the head and breast. This circumstance, taken in connection with the late date of capture, suggests that possibly it may have been a sick bird, which failed to accompany the others in the northward migration—the species not being known to breed so far south." (W. E. C. Todd.)

This seems to be a rare migrant in Costa Rica and has only been taken near the Pacific coast. Underwood took three specimens in the vicinity of Miravalles during a five months' trip, and reports it rare. Mr. Lankester says he saw none during three months' collecting in that general region. We have a single record from the eastern slope, a bird collected at Angostura by J. Carmiol, as reported by Lawrence in his Catalogue. It seems to prefer shrubbery and open woodland.

#### 714. *Oryzoborus funereus* Sclater.

*Oryzoborus funereus* SCLATER, Proc. Zool. Soc. Lond., 1859, 378 (Suchapam, Oaxaca, S. Mexico [P. L. Sclater]).—ZELEDÓN, Cat. Aves de C. R., 1882, 8; An. Mus. Nac. de C. R., I, 1887, 111 (Costa Rica).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 28 (Boruca).—RIDGWAY, Birds of North and Mid-Amer., I, 1901, 605 (southern Mexico to Isthmus of Panama; Colombia, western Ecuador ?).—BANGS, Auk, XXIV, 1907, 311 (Boruca and Barránca de Térraba, four specimens [Underwood]).

Bangs Collection: Juan Viñas, 1 adult ♀, March 20, 1902 (Underwood).

Evidently a very rare bird in Costa Rica and one which I was never fortunate enough to find. Most of the specimens recorded have been taken in the Pacific coast region, and it is probably most abundant in the Térraba Valley. I have been unable to learn anything of its habits, but presume it is to be met with on the "sabanas," or along their borders, where *Sporophila morelleti* and *Volatinia jacarini splendens* are found.

#### 715. *Cyanocompsa concreta concreta* (Du Bus).

*Cyanoloxia concreta* DU BUS, Bull. Ac. Roy. Brux., XXII, pt. I, 1855, 150 (Mexico).

*Cyanocompsa concreta concreta* RIDGWAY, Birds North and Mid. Am., I, 1901 596 (southern Mexico to Nicaragua and northern Costa Rica [Rio Frio<sup>1</sup>]).

<sup>1</sup>Although Dr. Richmond does not give this bird in his list as coming from Rio Frio (Proc. U. S. Nat. Mus., XVI, 1893, 492) the skin to which Mr. Ridgway refers was doubtless collected by Dr. Richmond.

I have not seen the specimens upon which Mr. Ridgway bases the occurrence of this bird in Nicaragua and northern Costa Rica, but I find that out of a considerable series collected in northern Costa Rica near the Nicaraguan boundary, none could be referred to it, all being unmistakably the southern race, even the birds from British Honduras being identical with Costa Rican specimens of the following form.

716. **Cyanocompsa concreta cyanescens** Ridgway.

*Cyanoloxia concreta* DU BUS, Bull. Ac. Roy. Brux., XXII, 1855, 150.

*Guiraca cyanoides* ZELEDÓN, Cat. Aves de Costa Rica, 1882, 8.

*Guiraca concreta* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (Turrialba and Angostura [J. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1885, 345 (C. R. [Frantzius], Turrialba, and Angostura [Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 74, *part* (Tempate and Tucurríqui [Arcé]).—CHERRIE, Expl. Zool. Rio Naránjo, 1893, 14.—UNDERWOOD, Ibis, 1896, 436 (Miravalles).

*Guiraca cyanoides concreta* RIDGWAY, Proc. U. S. Nat. Mus., V, Sept. 5, 1882, 392 (La Palma de Nicoya [Nutting]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Jiménez, Pacuare, and Rio Súcio).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 28, (Boruca, Térraba, and Buenos Aires).

*Cyanocompsa concreta cyanescens* RIDGWAY, Birds North and Mid. Amer., I, 1901, 597 (southern Honduras to western Ecuador).—BANGS, Auk, XXIV, 1907, 311 (Boruca, Paso Real, and El Pozo de Térraba [Underwood]).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón) (Basulto), Pígres (Ridgway), Jiménez (Alfaro) (Verrill), Rio Súcio (Cooper), Buena Vista (Castro and Fernandez), Pózo del Pital (Cherrie).

Bangs Collection: Pózo Azul, Carrillo, Coralillo, Buenos Aires, La Vijagua, El General de Térraba (Underwood).

C. H. Lankester Collection: Guácimo.

Carnegie Museum: Guápiles, Rio Sicsola, Cuábres, El Hogar, Esparta; Coronado, Boruca, and El Pózo de Térraba; Pózo Azul de Pirris (Carriker). Twenty-three skins.

After a careful study of the large series of birds in the Carnegie Museum and those belonging to Mr. Bangs, the conclusion is obvious that all Costa Rican specimens of *Cyanocompsa concreta* must be referred to the southern race, *cyanescens*, although not typical of that form. Even birds from British Honduras have exactly the same coloration and the same slender bill as those from Costa Rica, none of them having the dull blue color and heavy bill of Mexican specimens. All specimens from the Térraba Valley and some from farther north on the Pacific coast are almost, if not



quite, as blue as some of the birds from Panama, but *none* of the Costa Rica birds are as bright as *some* of the Panama specimens.

This species has a wide range, covering the whole of the Caribbean and Pacific lowlands up to an elevation of not more than 2,000 feet, being more abundant below 1,000 feet. It is fairly abundant throughout its range and is almost entirely confined to the heavy forest and dense jungle. The birds are inclined to be rather noisy at times and are usually seen in pairs.

The only nest observed was taken at Cuábre, Talamanca, March 5, 1904, and contained two slightly incubated eggs. The nest was made of brown weed-stalks and rootlets, lined with fine weed-fibres, was very thin-walled and in general construction much resembled that of *Zamelodia ludoviciana*. It was placed in a small shrub about eight feet above the ground in a thick part of the forest near the river. The eggs are pale bluish-green, speckled and spotted with lilac and chestnut, more heavily about the larger end, forming a cap. Measurements:  $23 \times 16$ ;  $22 \times 16$  mm.

717. *Passerina ciris* (Linnæus).

*Emberiza ciris*, LINNÆUS, Syst. Nat., ed. 10, 1758, 179.

*Passerina ciris* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Las Trojas).—

CHERRIE, Expl. Zool. en Costa Rica, 1891-2, 1893, 29 (Lagarto and Buenos Aires).

*Cyanospiza ciris* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (Costa Rica [*vide* Prof. S. F. Baird]).—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—

BOUCARD, Proc. Zool. Soc. Lond., 1878, 57 (Tres Rios [a dead bird found]).

—ZELEDÓN, Cat. Aves de Costa Rica, 1882, 8.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 365 (Tres Rios [Boucard]).—UNDERWOOD, Ibis, 1896, 436 (Bagáces and Miravalles).—RIDGWAY, Birds North and Mid. Amer., I, 1901, 586 (southern U. S., south in winter to the Bahamas, Cuba, whole of Mexico, and through Central America to Veragua).

U. S. Nat. Museum: Pígres, March 11, 1905 (Ridgway), Volcan de Póas, Jan. 22, 1905 (Zeledón).

Bangs Collection: Bolson, December, 1907 (Underwood).

The only record we have for Costa Rica, outside of the Pacific coast region, is that of a bird taken at Tres Rios by Boucard, who found it dead.

Cherrie found it fairly abundant in the Térraba Valley and Underwood secured a good series at Bolson, on the Tempisque River, during December, 1907. Through all my collecting on the Caribbean lowlands I have never seen or heard of the bird there.

718. *Passerina cyanea* (Linnæus).

*Tanagra cyanea* LINNÆUS, Syst. Nat., ed. 12, I, 1766, 315.

*Passerina cyanea* RIDGWAY, Proc. U. S. Nat. Mus., V, 1883, 495 (Volcan de Irazú [Nutting]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Santa Maria de Dota, El Zarcéro de Alajuéla, and Pacuare).—CHERRIE, Auk, VII, 1890, 334 (San José); Auk, IX, 1892, 247 (San José, Oct. and Nov.); Expl. Zool. en C. R., 1891-2, 29 (Lagarto and Buenos Aires).

*Cyanospiza cyanea* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (Barránca, San José, and Dota [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—BOUCARD, Proc. Zool. Soc. Lond., 1878 (San José, March).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 364 (Barránca, San José, Dota [Carmiol]).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 617 (Barránca, Feb. 27; San José, Jan. 24 [J. Carmiol]).—RIDGWAY, Birds of North and Mid. Amer., I, 1901, 582 (eastern U. S. and British Provinces, south in winter to the Bahamas, Cuba, and through eastern Mexico and Central America to Veragua).

Bangs Collection: Bolson, Dec., 1907, Coralillo, Apr. 5-9, 1908 (Underwood).

C. H. Lankester Collection: Volcan de Póas.

Fleming Collection: Carrillo, Nov., Pózo Azúl, Feb., Santa Ana, May (Underwood).

Carnegie Museum: Tierra Blanca, Apr. 11, 1902 (Carriker), Pózo Azúl, Feb. 17, 1898 (Underwood). Two skins.

A winter resident over the greater part of the country, but more commonly found on the plateau region and the Pacific coast, where there are many fields and open "sabanas" to attract them.

719. *Amaurospiza concolor* Cabanis.

*Amaurospiza concolor* CABANIS, Jour. für Orn., IX, Jan., 1861, 3 (Costa Rica [Frantzius]; Berlin Museum ?).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (Costa Rica).—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—ZELEDÓN, Cat. Aves de C. R., 1882, 9; An. Mus. Nac. de C. R., I, 1887, 111. —SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1885, 350 (Costa Rica [Frantzius]).—UNDERWOOD, Ibis, 1896, 436 (Miravalles).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 156.—RIDGWAY, Birds of North and Mid. Amer., I, 1901, 579 (Isthmus of Panama to Costa Rica).—BANGS, Auk, XXIV, 1907, 311 (Boruca, ♂, June 16, 1906 [Underwood]).

Bangs Collection: Tenorio, Jan. 25-28, 1908, 2 ♂-♀ (Underwood).

C. H. Lankester Collection: Miravalles, ♂, June 25, 1906.

From what information I have been able to procure in regard to this rare bird, it seems to be found along the edge of woodland or amongst the shrubbery or stunted trees scattered about in the "sabanas" of western

Costa Rica. Nothing is known of its breeding habits, but doubtless they are similar to those of the *Sporophila*.

720. *Sporophila moreletii* (Bonaparte).

*Sp[ermophila] moreletii* "Pucheran" BONAPARTE, Consp. Av., I, 1850, 497 (Guatemala; Paris Mus.).

*Spermophila moreletii* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (San José [J. Carmiol], Grecia [F. Carmiol]).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.

*Sporophila moreletii* CABANIS, Jour. für Orn., 1861, 4 (Costa Rica; synonymy).—RIDGWAY, Birds of N. and Mid. Amer., I, 1901, 575 (Valley of Lower Rio Grande, south through eastern Mexico, Guatemala, British Honduras, Honduras, to western Costa Rica: San José, Grecia, Turrialba, Irazú, Lagarto, Alajuela, Cartago, etc.).—BANGS, Auk, XXIV, 1907, 311 (El Pózo de Térraba [Underwood]).

*Spermophila moreletii* BOUCARD, Proc. Zool. Soc. Lond., 1878, 58 (San José).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1885, 352 (San José [Hoffmann and Carmiol], Grecia [Carmiol], Turrialba [Arcé], Irazú [Rogers]).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 123 (same localities as in Biologia).—CHERRIE, Expl. Zool. en C. R., 1891-2, 1893, 28 (Lagarto de Térraba).

*Sporophila moreletii* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Alajuela, Cartago, and San José).—CHERRIE, Auk, IX, 1892, 27 (W. Costa Rica; San José to Pacific coast).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Basulto), Santa Maria de Dota (Basulto), Pígres (Zeledón), San José (Alfaro) (Cherrie), Irazú, La Estrella, Alajuela.

Bangs Collection: Pózo Azul, Irazú, Tenorio, Coralillo, Bolson (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Juan Viñas, Esparta, Boruca (Carriker), Azahar de Cartago, and San José (Underwood). Five skins.

This is the most widely distributed of the genus in Costa Rica, being present in the northern part of the Caribbean lowlands, up over the central plateau and over the whole of the Pacific slope. However, it is nowhere so abundant in individuals as either *S. corvina* or *aurita* in their respective ranges. Its favorite haunts are roadsides, abandoned fields, waste land, and bushy pastures. I found it fairly common on the "Old Line" from La Junta to Carillo, but more so about Guápiles, where a nest was found beside the railroad track in a clump of tall grass. On July 16 the nest contained two slightly incubated eggs. It was a very frail structure with transparent walls, built of very fine grasses and rootlets. The eggs were pale bluish-white, sparsely speckled and dotted with chestnut-brown,

more thickly about the larger end, forming a wreath. Measurements:  $16.5 \times 12.5$ ;  $16.5 \times 13$  mm.

721. *Sporophila aurita* (Bonaparte).

*Sp[ermophila] aurita* BONAPARTE, Consp. Av., I, 1850, 497 ("Brazil").

*Spermophila aurita* BOUCARD, Proc. Zool. Soc. Lond., 1878, 58 (San Mateo, one ♂).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1885, 354 (Costa Rica [Hoffmann and Frantzius]).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 133 (Costa Rica).

*Sporophila aurita* CHERRIE, Expl. Zool. en Costa Rica, 1891-2, 28 (Térraba and Buenos Aires).—RIDGWAY, Birds N. and Mid. Am., I, 1901, 573 (Guatemala, Costa Rica [San Mateo, Térraba, Buenos Aires], Chiríqui, Veragua, Isthmus of Panama).—BANGS, Auk, XXIV, 1907, 311 (Boruca, Paso Real, El Pózo, and Barránca de Térraba [Underwood]).

*Sporophila hoffmanni* CABANIS, Jour. für Orn., IX, Jan., 1861, 6 (Costa Rica).

*Spermophila hoffmanni* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (Costa Rica).—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.

*Spermophila semicollaris* LAWRENCE, Ann. Lyc. N. Y., VIII, 1863 (Lion Hill, Panama [coll. G. N. Lawrence]).

U. S. National Museum: Pígres (Zeledón) (Ridgway).

Bangs Collection: Pózo Azul de Pirrís, Buenos Aires, El General de Térraba, and Bolson (Underwood).

Carnegie Museum: Buenos Aires, Boruca, El Pózo de Térraba, and Pózo Azul de Pirrís (Carriker), Pózo Azul (Underwood). Seventeen skins.

"The series is remarkably uniform in coloration, all being referable to the form described as *Spermophila semicollaris* Lawrence. All the Costa Rican birds in other collections examined likewise belong to this phase, while the specimens from Panama show great variation. A female from Boruca (July 22), provisionally referred here, is deep buffy below, very much like the specimen of *S. gutturalis* from El Pózo, but with a decidedly smaller bill." (W. E. C. Todd.)

The Costa Rican range of this species is confined to the southwestern portion of the country, it being most abundant in the Térraba Valley, and diminishing in numbers northward. It is still fairly common at Pózo Azul de Pirrís and is rarely taken up along the Gulf of Nicoya and in southern Guanacaste. In these regions it seems to have entirely taken the place of the common eastern form, *S. corvina*, and is abundant along the grass-grown river-banks, along the borders of the "sabanas," and in the bushy pastures. No nests were observed, as the breeding season had passed.

722. *Sporophila crissalis* Carriker.

*Sporophila crissalis* CARRIKER, Ann. Carnegie Museum, IV, April 1, 1908, 301 (Buenos Aires de Térraba, August 23, 1907, M. A. Carriker, Jr.; coll. Carnegie Mus.).

Carnegie Museum: Buenos Aires de Térraba, August 23-27, three males (Carriker).

Adult male (?).—Above dark slate-gray, feathers edged with dull grayish olive, brighter on the lesser and middle coverts, secondaries, and tertials; primaries and primary-coverts sooty-black, the former edged with pale buffy-olive, and with a patch of buffy-white at the base of the innermost, forming a partly exposed speculum; tail sooty-black above, narrowly edged with the color of the back, paler sooty-gray below; sides of head and neck dark olive-grayish, paler than the upper parts; chin and throat and median portion of abdomen white, throat faintly tinged with olive-grayish, band across the chest and the whole of the sides and flanks dull grayish-buffy or buffy-brown; under tail-coverts buffy-white; iris hazel; bill blackish-horn; feet olive-horn. Measurements of type: length (in flesh), 126; wing, 61; tail, 40; exposed culmen, 9; tarsus, 12.5 mm.

Immature male.—Similar to the adult, except that the upper parts are decidedly olive, the slaty bases of feathers not showing; the under parts are also more olivaceous, the throat and center of the abdomen being washed with pale dull olive, while the chest and sides are purer olive, without any of the brownish cast of the adult; the under tail-coverts are deeper buffy; the buffy-white speculum at the base of the primaries is entirely wanting.

This species is nearest to *S. grisea* of Panama and northern South America, but is distinguished from it by having the crown concolor with the back and not slate-gray, and by the absence of black on the lores, and by having the throat whitish instead of slate-gray as in *grisea*; the breast also is grayish olive-brown and not white, while the under tail-coverts differ in being buffy instead of white. The bill of *crissalis* is very heavy, almost matching that of *S. corvina*, from which it differs only in having slightly straighter lines from base to tip, being less swollen in the median portion.

The birds seemed to be fairly common about Buenos Aires, but very difficult to secure. They were always seen in small trees or even tall trees in open woodland, and seemed to go in small flocks. They have a peculiar low penetrating note, very hard to locate, and while in a tree they remain perfectly still, so that it is almost impossible to see them. On several occasions I heard them calling but was unable to locate them before they flew away.

723. *Sporophila corvina* (Sclater).

*Spermophila corvina* SCLATER, Proc. Zool. Soc. Lond., 1859, 379 (Playa Vicente, Oaxaca, S. Mexico, coll. P. L. Sclater). — LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (Pacuare, Angostura [J. Carmiol], Turrialba [F. Carmiol]). — FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica). — BOUCARD, Proc. Zool. Soc. Lond., 1878, 58 (San Carlos). — ZELEDÓN, Cat. Aves de C. R., 1882, 8. — SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1885, 355 (Turrialba [Arcé and Carmiol], Angostura, Pacuare, and San José [Carmiol]). — SHARPE, Cat. Birds Brit. Mus., XII, 1888, 137 (same localities as given in the Biologia).  
*Sporophila corvina* CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 169 (San José [Carmiol]). — ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Jiménez, Las Trojas, and Angostura). — RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 492 (Rio Frio). — RIDGWAY, Birds of North and Mid. Amer., I, 1901, 571 (southern Mexico, south through more eastern parts of Central America to Costa Rica: Angostura, Pacuare, Turrialba, San Carlos, San José, Las Trojas, Sipúrio, Naránjo, Puerto Limon, etc.).

U. S. Nat. Museum: Bonilla (Ridgway) (Basulto), Guayábo (Ridgway and Zeledón), San Bernardo, Uvita Island, Buena Vista (Castro and Fernandez), Jiménez (Alfaro) (Verrill), La Concepcion de Jiménez (Cherrie), Carrillo (Underwood).

Bangs Collection: Carrillo and La Vijagua (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), El Hogar (Carriker), Jiménez, Carrillo, Cariblanco, Juan Viñas (Underwood). Seven skins.

Abundant throughout the lower portion of the Caribbean slope, and extending upward in small numbers to 3,000 ft. (Juan Viñas). Not present on the central plateau or Pacific slope. Their favorite haunts are roadsides, old fields, bushy pastures, and the grass-grown edges of streams. They are almost always to be seen in small flocks, and usually in company with *S. morelleti* and *Volatinia jacarini splendens*. The breeding season in the vicinity of Guápiles begins about May 1 and lasts till July 15.

The nest is built of rootlets and weed-fibres, with very thin walls and no other lining than the rootlets of the main structure. It is usually placed in a bush or weed about three or four feet from the ground in an open field or pasture, although they are occasionally seen in small trees as high as fifteen feet above the ground. Two eggs are invariably laid, which are buffy-white, and almost completely covered with specks, spots, and blotches of earthy-brown or olive-brown, and often with a few large overlying blotches of umber-brown. There is a great range of variation in both the ground-color and markings, but they are always more heavily marked than those of *Volatinia*. Measurements: 17-18.5 × 13-13.5 mm.

724. *Sporophila gutturalis* (Lichtenstein).

*F[ringilla] gutturalis* LICHTENSTEIN, Verz. Doubl., 1823, 26 (Sao Paulo, S. Brazil; Mus. Berlin).

*Sporophila gutturalis* BANGS, Auk, XXIV, 1907, 311 (El Pózo de Térraba, one male [Underwood]).

Carnegie Museum: El Pózo de Térraba, ♀ (Carriker).

"A specimen from El Pózo (28336, ♀), collected June 17, 1907, is provisionally referred to this species. It differs from Colombian examples in being much more buffy beneath. The species was found at this same locality by Underwood in 1906, that being the first record for Costa Rica." (W. E. C. Todd.)

The specimen above cited was taken along the beach of the Rio Grande in company with *S. aurita*, but no males were noticed, although there were undoubtedly some in the vicinity.

725. *Sporophila minuta minuta* (Linnæus).

[*Loxia*] *minuta* LINNÆUS, Syst. Nat., ed. 10, I, 1758, 176 (Surinam).

*Sporophila minuta minuta* CARRIKER, Ann. Carnegie Museum, IV, 1908, 302 (Buenos Aires de Térraba, one ♂ juv. [Carriker]).

Collection E. A. & O. Bangs: Buenos Aires de Térraba, ten specimens, adults of both sexes, May, 1908 (Underwood).

Carnegie Museum: Buenos Aires, Sept. 2, 1907, one ♂ (Carriker).

The single male taken by myself in 1907 is the first Costa Rican record for this Panaman species. During my stay in Buenos Aires no others were seen, they being probably in a different locality at that time of year, for the following May Underwood found them abundant in the same "sabanas" where my single specimen was secured. I also saw two birds on a little "sabana" on the ridge south of Boruca, but was unable to secure them. They seem to frequent the open grassy savannas rather more than bushes, as do some other species of the genus.

726. *Tiaris olivacea pusilla* (Swainson).

*Tiaris pusilla* SWAINSON, Philos. Mag., new series, I, 1827, 438 (Real del Monte, Hidalgo, Mexico).

*Euethia pusilla* CABANIS, Jour. für Orn., 1861, 2 (Costa Rica [Frantzius and Hoffmann]).

*Euethia pusilla* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Alajuela).—CHERRIE, Auk, IX, 1892, 247 (Costa Rica, both slopes down to 2,000 ft.).

*Phonipara pusilla* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (San José [Frantzius] and Sarchí [J. Carmiol]).—CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 169

(San José [Carmioli]).—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 58 (San José).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.—RIDGWAY, Proc. U. S. Nat. Mus., V, 1883, 495, 499 (Irazú and San José [Nutting]).—SALVIN and GODMAN, Biol. Centr.-Am., I, 1885, 359 (San José [Frantzius and Carmiol], Sarchí [Carmioli], Turrialba [Arcé]). *Eueltheia olivacea pusilla* RIDGWAY, Birds of North and Mid. Amer., I, 1901, 534 (eastern Mexico; Costa Rica to Central Colombia; not yet recorded from Brit. Honduras, Honduras, Nicaragua, Salvador, or Guatemala, except Peten district).

U. S. Nat. Museum: Guayábo (Ridgway and Zeledón), Bonilla (Ridgway), San José (Alfaro) (Cherrie), Alajuela (Alfaro), Juan Viñas (Underwood).  
Bangs Collection: Vicinity of San José, San Pedro de San José (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Guápiles, San José, Guaitíl (Carriker), San Pedro de San José, and Los Cuádras de Irazú (Underwood). Six skins.

"The distribution of this species is extremely peculiar, there being no records from farther north, save one in Guatemala, until Mexico is reached, where the bird again becomes common." (W. E. C. Todd.)

Probably the most abundant small passerine bird in the Caribbean lowlands wherever cleared land is found, being especially fond of roadsides, grass-grown fields, banana-plantations and pastures. From the eastern coast it works its way upward to the central plateau in decreasing numbers, but is still common throughout most of that region. Although such an abundant resident, I was never able to find its nest, and do not know whether it is placed on the ground or in bushes, but presume that it is built on the ground in the grass.

#### 727. *Volatinia jacarini splendens* (Vieillot).

*Fringilla splendens* VIEILLOT, Nouv. Dict. d'Hist. Nat., XII, 1817, 173 (Cayenne; based on *Moineau de Cayenne* BUFFON, Pl. Enl., Pl. 224, fig. 3).

*Volatinia splendens* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1885, 357 (San José [Frantzius], Barranca, and Grecia [Carmioli]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (San José).—CHERRIE, Auk, IX, 1892, 27 (San José, etc., Pacific side); Expl. Zool. Costa Rica, 1891-2, 1893, 29 (Boruca, Térraba, and Buenos Aires).

*Volatinia jacarina* CABANIS, Jour. für Orn., 1861, 2 (C. R. [Frantzius and Hoffmann]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (San José [Frantzius], Barranca [J. Carmiol], Grecia [F. Carmiol]).—CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 169 (San José).—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 57 (San José).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 392 (La Palma de Nicoya; habits).



*Volatinia jacarini* SHARPE, Cat. Birds Brit. Mus., XII, 1888, 152 (Barránca [Carmioli]).

*Volatinia jacarini splendens* RIDGWAY, Birds North and Mid. Amer., I, 1901, 526 (southern Mexico, southward through Central America to western and central Ecuador, Guiana, Trinidad, and Lesser Antilles).—BANGS, Auk, XXIV, 1907, 311 (Boruca and Paso Real de Térraba [Underwood]).

U. S. National Museum: Bonilla (Basulto), Pígres (Ridgway), Santa Maria de Dota (Basulto), Alajúela, and San José (Alfaro).

Bangs Collection: Cachí, Pózo Azul, Coralillo, Bolson, Tenorio, Buenos Aires, and El General de Térraba (Underwood).

C. H. Lankester Collection: Mojica.

Carnegie Museum: Boruca, Paso Real, Buenos Aires, Pózo Azul, Guápiles, Guácimo, Bebedero (Carriker), Tambór, and Pózo Azul (Underwood). Twenty-two skins.

"There is a good series illustrating the postjuvenal moult of the male, which begins in July. The first nuptial plumage is evidently attained by wear, the brown feather-tips wearing off more or less. The fully adult dress is not assumed until the first postnuptial moult. The concealed white shoulder patch is not present in all specimens." (W. E. C. Todd.)

Found fairly abundantly at the lower altitudes on both the Caribbean and Pacific slopes, ranging from sea-level to a height of about 2,000 feet in abundance, and found sparingly at greater altitudes. Its habits are the same as those of the genus *Sporophila*, always being found in company with *S. corvina* and *morelleti* on the eastern side, and *S. aurita* and *morelleti* on the Pacific.

A nest taken July 16, 1905, at Guácimo, was very delicately built of grass-stems and fine weed-fibres, hung between several tall stalks of grass, three feet from the ground. The two eggs were bluish-white, thickly speckled, dotted and blotched with markings of dull purplish-lilac, and with numerous heavy spots of burnt umber, the markings being thicker about the larger end, forming in one a cap and in the other a wreath. Measurements:  $16.5 \times 13$ ;  $17 \times 13$  mm.

#### 728. *Spodiornis uniformis* (Sclater and Salvin).

*Haplospiza uniformis* SCLATER and SALVIN, Nomencl. Av. Neotr., 1873, 157 (near Jalapa, Vera Cruz, S. E. Mexico; coll. Salvin and Godman).

*Spodiornis uniformis* HELLMAYR, Nov. Zool., XIII, 1906, 308 (1 ad. ♂, Carrillo, C. R., Dec. 4, 1898 [C. F. Underwood]; Tring Mus.).

The only record of the occurrence of this rare species in Costa Rica is the specimen recorded above by Hellmayr as having been collected at Carrillo by C. F. Underwood.

729. ***Acanthidops bairdi*** Ridgway.

*Acanthidops bairdi* RIDGWAY, Proc. U. S. Nat. Mus., IX, 1882, 336 (Volcan Irazú [J. Cooper]; coll. U. S. Nat. Mus.); VI, 1884, 414; XI, 1888, 196 (description of ad. ♂ from El Alto, Volcan de Póas [Alfaro]).—SCLATER, Ibis, 1884, 241.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 434 (Irazú [Cooper]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112.—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 234 (Volcan Irazú).—RIDGWAY, Birds of North and Mid. Am., I, 1901, 519 (highlands of Costa Rica, Volcan de Irazú, Volcan de Póas, San José, etc.).

U. S. Nat. Museum: Volcan de Póas (Alfaro).

Bangs Collection: Escazú, July 19, 1899, 1 ♂ (Underwood).

C. H. Lankester Collection: Volcan de Póas.

Carnegie Museum: Volcan de Irazú, 1 ♂ juv., Volcan de Turrialba, 1 ♂ (Carriker).

Field Museum: Volcan de Turrialba, 1 ♂ (Carriker).

Found only near or above timber-line on the high volcanoes, but a very rare bird and not often met with. The first one I took was on Irazú above timber-line, not far below the summit of the volcano, where it was perched on the tip of a scrubby bush and apparently alone. In April, 1907, while collecting near timber-line on the Volcan de Turrialba, a small flock of perhaps five or six birds came flying along the edge of a patch of trees, alighting just over my head. One was secured, after which the remainder disappeared. Another single male was taken the same day in a dense thicket at the base of the crater.

730. ***Pinaroloxias inornata*** (Gould).

*Cactornis inornata* GOULD, P. Z. S., 1843, 104 (Bow Island ?).

*Cocornis agassizi* TOWNSEND, Bull. Mus. Comp. Zool., XXVII, 1895, 123, colored plate (Cocos Island; coll. U. S. Nat. Mus.).—RIDGWAY, Birds N. and Mid. Amer., I, 1901, 516 (Cocos Island, Pacific Ocean).

*Pinaroloxias inornata* SHARPE, Cat. Birds Brit. Mus., X, 52 (Bow Island ?).—RICHMOND, Proc. Biol. Soc. Wash., XV, 1902, 247 (critical).

U. S. Nat. Museum: Cocos Island (Townsend) (Alfaro).

Dr. Richmond has brought forward unquestionable proof that *Cocornis agassizi* Townsend is the same thing as *Cactornis inornata* Gould, under which specific name it must now be known, while Mr. Ridgway has taken the genus from the *Dicaeidae* and placed it in the family *Fringillidae*, where it evidently really belongs, being closely related to other fringilline genera. This species is evidently found only on Cocos Island, where, according to Mr. Townsend, it is the only really abundant land

bird. He further says that it is finch-like in its habits, continually flitting about from branch to branch.

731. **Pezopetes capitalis** Cabanis.

*Pezopetes capitalis* CABANIS, Jour. für Orn., Nov., 1860, 415 (Costa Rica; Berlin Mus.).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 101 (Costa Rica).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 254 (Volcan de Cartago [Arcé], Irazú district [Rogers]).—RIDGWAY, Birds of North and Mid. Am., I, 1901, 472 (highlands of Costa Rica [Volcan de Cartago, Volcan de Irazú] and Chiriquí [Volcan de Chiriquí]).

*Buarremon capitalis* BOUCARD, Proc. Zool. Soc. Lond., 1878, 55 (Volcan de Irazú).—ZELEDÓN, Cat. Aves de C. R., 1882, 8; An. Mus. Nac. de C. R., I, 1887, 110 (Volcan de Irazú).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 322, pl. XXIII, fig. 1 (Irazú [Arcé, Rogers, and Boucard]).

U. S. Nat. Museum: Volcan de Turrialba, Volcan de Irazú (Ridgway and Zeledón), Las Vueltas de Dota (Basulto), Irazú (Cherrie) (Cherrie and Castro).

Bangs Collection: Volcan de Irazú, Azahar de Cartago, Cachí (Underwood).

C. H. Lankester Collection: Póas, Irazú, and Turrialba.

Carnegie Museum: Volcan de Irazú, Volcan de Turrialba, Ujurrás de Térraba (Carriker). Nine skins.

"Two birds in juvenal plumage are darker above, the feather-tips black, producing a barred effect; crown black, with an indistinct median line of olive-green; beneath buffy-olive, heavily streaked with black, the streaks confluent on the chin. Maxilla dark (in dried skins); mandible paler. Iris of adult hazel. The two September specimens are noticeably browner (less olivaceous) than the rest of the series, but this is doubtless due to their fresher plumage." (W. E. C. Todd.)

This bird inhabits only the higher peaks and mountain ranges and is not, as a rule, seen below 7,000 feet, while it is most abundant at 8,000 to 9,000 feet. All Costan Rica references for the species are from Volcan de Irazú, but it has been found by several collectors on Turrialba, by Underwood in the Candelaria Mountains, while I found it abundant in the high ranges of southern Costa Rica.

They are almost invariably seen in couples, hopping about on the ground or scratching most industriously among the leaves in the forest or under the bamboo clumps so abundant at high altitudes. According to my observations on Irazú, the breeding begins from the 1st to the 10th of April. Four nests were found, one on the 10th, containing one egg partially in-

cubated, and three on the 16th, two containing one egg and the third two eggs, all partially incubated. One egg seems to be the usual clutch, but one nest out of four having two eggs, while of the set of two, but one was marked, showing that the pigment was exhausted on the first egg laid. The nest is bulky, loosely built, and constructed of weed-stalks and bamboo leaves, lined with soft blades of grass and placed in a thick bush or on a bamboo spray not far above the ground. The eggs vary from dull white, with a faint tinge of blue, to pale bluish, sparsely speckled and dotted over the whole surface with a few markings of lilac and heavier blotches of burnt umber or sooty, thicker at the larger end, and sometimes entirely wanting at the smaller. Average measurements :  $29 \times 19.4$  mm.

732. *Pselliophorus tibialis* (Lawrence).

*Tachyphonus tibialis* LAWRENCE, Ann. Lyc. N. Y., VIII, June, 1864, 71 (San José; U. S. Nat. Mus.); IX, 1868, 101 (San José and Dota [J. Carmiol], Irazú [Cooper], Rancho Redondo [F. Carmiol], and Quebrada Honda [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 299 (Dota Mts., Irazú, La Palma de Irazú, Rancho Redondo, and Quebrada Honda).

*Buarremon tibialis* BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (Navárrro and Volcan de Irazú).—ZELEDÓN, Cat. Aves de C. R., 1882, 8; An. Mus. Nac. de C. R., I, 1887, 110 (La Palma, Volcan de Irazú).—SALVIN and GODMAN, Biol. Centr.-Am., I, 1884, 322 (San José, Dota, Parita [Carmiol], Rancho Redondo [Frantzius and Carmiol], La Palma, and Quebrada Honda [Frantzius], Volcan de Irazú [Arcé, Rogers, and Cooper], Navárrro [Boucard]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 262 (Irazú [Rogers and Arcé], Parita and Rancho Redondo [Carmiol]).—ALFARO, Gac. Oficial de C. R., No. 288, Dec., 1888 (Volcan de Poas).

*Pselliophorus tibialis* RIDGWAY, Birds of North and Mid. Am., I, 1901, 469 (highlands of Costa Rica and Chiriquí).

U. S. Nat. Museum: Volcan de Turrialba, Coliblanco (Ridgway and Zeledón), El Copey, Las Vueltas, and La Lagunaria de Dota (Basulto), Achióte de Póas, Estrella de Cartago, and Azahár de Cartago (Alfaro), Burgos de Irazú (Castro).

Bangs Collection: Volcan de Irazú, Azahár de Cartago, and Escazú (Underwood).

C. H. Lankester Collection: Volcan de Turrialba.

Carnegie Museum: La Hondura, Volcan de Irazú (Carriker). Twenty-six skins.

"Some specimens, which are doubtless young, have the feathers on the tibiae more or less dark. There is also much individual variation as regards the presence and intensity of the olivaceous tinge on the breast. Further-

more, a number of birds have a more or less pronounced yellow edging to the wing. These characters do not seem to be correlated with age or sex, but are apparently purely individual." (W. E. C. Todd.)

Very common throughout the higher parts of the country, ranging from 3,500 feet to timber-line, but most abundant at about 9,000 feet on the volcanoes Irazú and Turrialba, where they are to be seen after the breeding season in small flocks, hopping about on the ground, or in the shrubbery of the forest, even venturing out into the edges of the pastures. They were also quite abundant near the summits of the mountains in southern Costa Rica.

Two nests were found on the Volcan de Irazú at an altitude of about 9,000 feet, on April 14 and 16, 1902, containing one and two eggs respectively, and both with incubation begun. The nests were built entirely of dry bamboo leaves, lined with fine stems of grass, and placed on sprays of bamboo from ten to fifteen feet above the ground in deep thickly wooded ravines. Eggs pale bluish, thickly speckled, spotted, and blotched with lilac and chestnut-brown, more heavily about the larger end, forming a patch or wreath. Average measurements:  $23.8 \times 18.5$  mm.

733. ***Buarremon costaricensis*** Bangs.

*Buarremon assimilis* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 101 (Guaitíl [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 300.—SALVIN, Ibis, 1874, 308 (crit.).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 257 (Costa Rica).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.—SALVIN and GODMAN, Biol. Centr.-Am., I, 1884, 318 (Guaitíl).—CHERRIE, Expl. Costa Rica, 1891-2, 26 (Boruca and Buenos Aires de Térraba).—RIDGWAY, Birds of North and Mid. Am., I, 1901, 468 (Costa Rica to Peru and Venezuela).

*Buarremon costaricensis* BANGS, Auk, XXIV, 1907, 310 (Boruca, Barránca de Térraba, and Lagarto de Térraba [Underwood]).

U. S. Nat. Museum: Pózo Azul de Pirrís.

Bangs Collection: El General de Térraba (Underwood).

Carnegie Museum: Boruca (Carriker). Six skins.

"A female taken July 18 is just beginning the postjuvenile moult. The juvenile plumage is brownish-olive above (as in *B. assimilis*), which color also replaces the ashy head-markings of the adult, the pattern being distinctly indicated; underneath greenish-olive, obscurely streaked with darker; mandible orange, with black base; maxilla black; iris hazel; feet dark horn. Adults have the bill entirely black. The characters distinguishing this species from *Buarremon assimilis* are obvious at a glance, and apparently constant." (W. E. C. Todd.)

Confined exclusively to the southwestern portion of Costa Rica and almost exclusively to the Térraba Valley, although two specimens are known to have been taken farther north, at Pózo Azul de Pirrís and Guaitíl. I found it most abundant at Boruca, in the second-growth scrub so common in that vicinity. Its habits are quite similar to those of the other members of the genus and closely allied genera. No nests were observed, I having reached Boruca at the end of the breeding season.

734. **Buarremon brunneinuchus** (Lafresnaye).

*Embernagra brunneinucha* LAFRESNAYE, Rev. Zool., 1839, 97 (Mexico; coll. Bost. Soc. N. H.).

*Buarremon brunneinuchus* CABANIS, Jour. für Orn., 1860, 415 (C. R. [Frantzius and Hoffmann]).—CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 169 (Dota, July, 1864 [J. Carmiol]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 101 (San José [Frantzius], Barránca and Dota [J. Carmiol], Grecia [F. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 300 ("in the forests of the high mountains").—BOUCARD, Proc. Zool. Soc. Lond., 1878, 55 (Cartago, Navárro, and Rancho Redondo).—ZELEDÓN, Cat. Aves de C. R., 1882, 7; An. Mus. Nac. de C. R., I, 1887, 110 (Cartago, El Zarcéro de Alajuéla, Santa Maria de Dota, Volcan de Irazú, and Rio Súcio).—CHERRIE, Expl. Val. Rio Naránjo, 1893, 14 (San Marcos).—RIDGWAY, Birds North and Mid. Am., I, 1901, 465 (southern Mexico through highlands of Central America to mountains of Peru and Venezuela).

*Buarremon brunneinucha* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 495 (Irazú, common).—SALVIN and GODMAN, Biol. Centr.-Am., I, 1884, 320 (Dota Mts., Barránca, Grecia [J. Carmiol], San José [Frantzius], Irazú [Rogers]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 258 (Dota [Carmiol], Irazú district [Rogers]).

U. S. Nat. Museum: Cartago and Naránjo (Cooper), Irazú (Cherrie), La Lagunaria and Santa Maria de Dota (Basulto), Rio Súcio, Estrella de Cartago.

Bangs Collection: Azahár de Cartago and Cariblanco de Sarapiquí (Underwood).

Fleming Collection: Escazú, Rancho Redondo, Cariblanco, La Palma (Underwood).

C. H. Lankester Collection: Cachí and Cariblanco.

Carnegie Museum: Volcan de Irazú, La Hondura, Ujurrás de Térraba (Carriker). Twelve skins.

"Several of the birds taken in September are evidently immature, showing remains of the juvenal plumage on the middle of the abdomen, while the forehead is olivaceous, not black, and the chestnut of the crown

paler and indistinctly defined. The mandible is also more or less yellow." (W. E. C. Todd.)

Found throughout the highlands wherever sufficient altitude is attained, the bird rarely going below 5,000 feet, and ranging up to timber-line. It breeds abundantly on the volcanoes Irazú and Turrialba between 8,000 and 10,000 feet. I found it fairly common also at La Hondura and Ujurrás de Térraba at about 5,000 to 6,000 feet. It is usually to be met with in pairs, always in the thick forest, on the ground or in the low bushes, hopping about actively, not at all shy and always rather silent. Breeding begins about April 15, four nests being taken, on April 16, 17, 18, and 19 respectively. Three nests contained but one egg each, the fourth two.

The nests are rather large and bulky, built of coarse grass and bamboo leaves, lined with finer blades of bamboo, and placed in low bushes in the forest. The eggs are pale bluish-white, unspotted. Average measurements:  $24.8 \times 16.1$  mm.

### 735. *Atlapetes gutturalis* (Lafresnaye).

*Arremon gutturalis* LAFRESNAYE, Rev. Zool., 1843, 98 (Colombia, type in coll. Bost. Soc. Nat. Hist.).

*Atlapetes chrysopogon* CABANIS, Jour. für Orn., 1860, 414 (Costa Rica [Frantzius and Hoffmann]); 1861, 94 (do.).

*Buarremon chrysopogon* CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 169 (Dota, July 24, 1864 [J. Carmiol]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 10 (Quebrada Honda [Frantzius], San José, and Dota [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 300 (San José, Dota, Quebrada Honda).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (San José and Cartago).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 495 (Volcan de Irazú).

*Buarremon gutturalis* SALVIN, Biol. Centr.-Am., Aves, I, 1884, 321 (Irazú [Rogers], Dota Mts. [Carmiol and Frantzius], Quebrada Honda and San José [Frantzius], Tucurríqui [Arcé]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 259 (San José [Carmiol], Irazú [Rogers], Tucurríqui [Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 110 (San José, Cartago, and Cervántes de Cartago).—CHERRIE, Proc. U. S. Nat. Mus., XIV, 1891, 532 (crit.); Auk, IX, 1892, 25 (San José; descr. of nest and eggs and young).

*Atlapetes gutturalis* RIDGWAY, Birds North and Mid. Am., I, 1901, 461 (highlands of Guatemala to Colombia).

U. S. Nat. Museum: San José (Ridgway and Zeledón) (Cherrie) (Underwood), El Copey, La Lagunaria, and Santa Maria de Dota (Basulto), Coliblanco (Ridgway), Cartago (Cooper).

Bangs Collection: Irazú and San José (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Tierra Blanca, Volcan de Irazú, Volcan de Turrialba, Juan Viñas, Ujurrás de Térraba (Carriker), San Pedro del Mojón, and San José (Underwood). Eleven skins.

Confined entirely to the highlands, being rarely seen below 2,000 feet, not going above 8,000 feet, and most abundant between 3,000 and 6,000 feet. They frequent the cleared lands, bushy pastures, and the fringes of open woodland, keeping in the bushes and low trees. After the breeding season they are seen in small flocks of from three to six and at such times are rather noisy, but are always very shy and difficult to approach in the open. No nests were observed.

### 736. *Lysurus crassirostris* (Cassin).

*Buarremon crassirostris* CASSIN, Proc. Ac. Nat. Sci. Phila., Aug., 1865, 170 (Barranca,<sup>1</sup> April 14, 1864 [J. Carmiol], U. S. Nat. Mus.).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 101 (Barranca [J. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 300.—ZELEDÓN, Cat. Aves de C. R., 1882, 8; An. Mus. Nac. de C. R., I, 1887, 110 (Rio Súcio).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 323 (Barranca [Carmiol]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 262 (Buena Vista<sup>2</sup> [Carmiol]).—RIDGWAY, Proc. U. S. Nat. Mus., XV, 1888, 540 (Rio Súcio [J. Cooper], crit.).

*Lysurus crassirostris* RIDGWAY, Birds North and Mid. Am., I, 1901, 458 (highlands of Costa Rica [Barranca, Buena Vista, Rio Súcio, etc.]).

U. S. Nat. Museum: La Lagunaria de Dota (Basulto), La Hondura (Alfaro).

Bangs Collection: Carrillo, La Hondura, Cariblanco (Underwood).

C. H. Lankester Collection: Cachi.

Carnegie Museum: La Hondura and Volcan de Turrialba (2,500 feet) (Carriker), Cariblanco de Sarapiquí, La Hondura (Underwood). Nine skins.

"In a young bird (25346, Cariblanco, Aug. 2, 1899), just entering upon the postjuvenile moult, the general color above is darker, more reddish-brown than in the adult, the crown clove-brown, with a few rufous feathers appearing; sides of the head dull dusky-olive, not sharply contrasted

<sup>1</sup>There is no doubt in my mind that this "Barranca" is the one which Frantzius refers to as being "An den Quellen der Barranca, nördlich von San Ramon" (Jour. für Orn., 1869, 316) and again "in dem kühlen, Klima an der Barranca" (Jour. für Orn., 1869, 308). There is a Rio Barranca, a tributary of the Rio Grande de Tárcoles, which rises on the southwestern slope of the Volcan de Póas, and which is most likely the one referred to.

<sup>2</sup>Buena Vista is on the trail from Grecia down the San Carlos valley and lies about fifteen miles northwest of Grecia.



with the crown; throat the same; white rictal stripe faintly indicated, rest of under parts dull brownish-green, with a few scattered yellow feathers on the abdomen. In three specimens from La Hondura the moult has been completed except on the crown, which is still largely clove-brown." (W. E. C. Todd.)

Apparently a rare bird in its range, which seems to be around the eastern and northern slopes of the Volcanoes de Irazú, Turrialba, Barba, and Póas, and in a few places in the Aguacate and Dota Mountains. It has been taken only between the altitudes of 2,000 and 4,500 feet and in the almost impenetrable jungle to be found at that elevation, especially on the Caribbean slope. Like all the finches of the *Buarremon* type, it is never seen far above the ground, and seeks the darkest, gloomiest ravines for its habitat. No nests were observed, although specimens were collected during the breeding season. Further investigation will most likely prove that the range covers the whole of the Caribbean slope between the altitudes mentioned above, and perhaps the more humid portions of the higher slopes of the Pacific.

737. **Arremon aurantirostris aurantirostris** Lafresnaye.

*Arremon aurantirostris* LAWRENCE, Ann. Lyc. N. Y., IX, 1868 (San Mateo [Cooper], Dota [Zeledón], Guaitíl [F. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 300 (doubtless taken from Lawrence's List).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1884, 324, *part* (San Mateo [Cooper], Dota [Zeledón], Guaitíl [Carmiol]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 275, *part* (San Mateo).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111, *part* (Trojas de Puntarenas and Pózo Azul de Pirrís).—CHERRIE, Expl. Zool. Costa Rica, 1891-2, 27 (Lagarto, Boruca, Térraba, and Buenos Aires de Térraba); Expl. Zool. Rio Naránjo, 1893, 14 (S. W. Costa Rica).—UNDERWOOD, Ibis, 1896, 436 (Miravalles).—RIDGWAY, Birds North and Mid. Amer., I, 1901, 455, *part* (southern Mexico, through Central America to Panama Railroad).—BANGS, Auk, XXIV, 1907, 310 (Boruca, Paso Real, Barranca de Puntarenas, Lagarto, and El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Pígres (Ridgway), Pózo Azul de Pirrís, and Pózo del Pital (Cherrie).

Bangs Collection: El General, Buenos Aires, Pózo Azul de Pirrís (Underwood).

Fleming Collection: Miravalles (Underwood).

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Pózo Azul de Pirrís, El Pózo de Térraba, Boruca, Buenos Aires (Carriker). Twenty skins.

"Five adult females differ in having the black pectoral band more restricted. Birds in juvenal and first winter plumage have black bills. One specimen from Pózo Azúl shows a very decided tinge of rufous on the back, similar to the type of *A. rufidorsalis* Cassin, which we have examined." (W. E. C. Todd.)

This species is very abundant throughout the Pacific lowlands, inhabiting the heavy forests, and keeping near the ground. It is usually seen in pairs. A nest containing young was found near Pózo Azúl, which was placed in about the same situation as that described under the following subspecies, *A. aurantirostris rufidorsalis*.

738. **Arremon aurantirostris rufidorsalis** (Cassin).

*Arremon rufidorsalis* CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 170 (Turrialba, May 24, 1865 [J. Carmiol]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 102 (Turrialba [F. Carmiol]).

*Arremon rufidorsalis* SALVIN, Ibis, 1874, 308, crit.

*Arremon aurantirostris* BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (San Carlos).—ZELEDÓN, Cat. Aves de C. R., 1882, 8.—SALVIN and GODMAN, Biol. Centr. Am., I, 1884, 324, *part* (Tucurríqui [Arcé], Turrialba [Carmiol]).—SCLATER, Cat. Birds Brit. Mus., XI, 1886, 275, *part* (Tucurríqui [Arcé]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111, *part* (Jiménez and Pacuare).—RICHMOND, Proc. U. S. Nat. Mus., XVI, 1893, 490, *part* (Rio Frio).—RIDGWAY, Birds North and Mid. Amer., I, 1901, 455, *part* (southern Mexico through Central America to Panama Railroad).

U. S. Nat. Museum: Bonilla (Ridgway and Zeledón), Jiménez (Alfaro).  
Bangs Collection: Carrillo, Tenorio (Underwood).

C. H. Lankester Collection: Cachí, Cariblanco de Sarapiquí, El Hogar.  
Carnegie Museum: Carrillo, El Hogar, Guápiles, Volcan de Turrialba (2,000 feet), Cuábre, and Rio Sicsola (Carriker). Fifteen skins.

After a careful examination of the large series of specimens from both the Caribbean and Pacific lowlands it became at once very evident that the form described by Mr. Cherrie under the name *A. aurantirostris saturatus* is a good one, all the characters pointed out by him holding good throughout the series, British Honduras birds also agreeing with it in all particulars. Unfortunately his name cannot be used for this race, since Mr. Cassin in 1865 described a specimen from the range of this bird under the name *rufidorsalis*. The eastern bird is distinguished from the western form by having the black much darker (dark olive-green, not yellowish-olive), the median crown stripe of ashy much broader; the superciliary line wider, pure white, and extending for its full width nearly to the nostril; the abdominal white area is slightly larger.

Its range covers the whole of the Caribbeian lowlands, down to Panama and at least as far north as British Honduras, and to an altitude of about 2,000 feet. Like the western variety, it keeps within the heavy, dark forest, on or near the ground, and is always easily recognized by its bright salmon-red bill. The nest is placed on the ground, usually at the foot of a small tree or shrub, and much resembles that of the Ovenbird, being domed over with leaves and sticks to match the surroundings, leaving only a small, well concealed opening on one side. The interior is lined with fine fibres and leaves. The two eggs are dull white, speckled and spotted about the larger end with burnt umber. Measurements: average,  $25 \times 17$  mm.

739. *Arremonops conirostris richmondi* Ridgway.

*Embernagra striaticeps* (not of Lafresnaye) CASSIN, Proc. Ac. Nat. Sci. Phil., 1865, 170 (Angostura, June 8, 1864 [Carmioli]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (Angostura [J. Carmioli]).—FRANTZIUS, Jour. für Orn., 1869, 301.—BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (San Carlos).—ZELEDÓN, Cat. Aves de C. R., 1882, 9; An. Mus. Nac. de C. R., I, 1887, 112 (Las Trójas, Pózo Azul de Pirris, Naránjo de Cartago, and Angostura).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 414 (Angostura [Carmioli]).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 762 (Tucurríqui and Bebedéro [Arcé], Angostura [J. Carmioli]).—CHERRIE, Expl. Zool. Costa Rica, 1891-2, 29 (Palmár, Boruca, Térraba, and Buenos Aires).—UNDERWOOD, Ibis, 1896, 436 (Miravalles, Bagáces).

*Arremonops richmondi* RIDGWAY, Auk, XV, July, 1898, 228 (Greytown, Nicaragua).

*Arremonops conirostris richmondi* RIDGWAY, Birds North and Mid. Am., I, 1901, 453 and 673 (southern Honduras to Veragua).—BANGS, Auk, XXIV, 1907, 310 (Boruca, Barranca de Térraba, Lagarto, El Pózo de Térraba [Underwood]).

U. S. Nat. Museum: Guayábo, Pígres (Ridgway and Zeledón), Bonilla (Alfaro), Pózo Azul (Zeledón) (Underwood), Guayabál, Carrillo (Underwood), Jiménez (Alfaro) (Verrill), Reventazón (Carranza), Naranjó de Cartago (Alfaro and Zeledón).

Bangs Collection: Pózo Azul, Buenos Aires, El General, Carrillo (Underwood).

Carnegie Museum: Guápiles (Carriker & Crawford), Rio Sicsola, El Pózo de Térraba, Boruca, Buenos Aires, Pózo Azul, Carrillo, El Hogar, Miravalles (Carriker), Juan Viñas, Pózo Azul, and Carrillo (Underwood). Thirty-two skins.

"The above series in this Museum includes a number of birds in juvenal

plumage, also some illustrating the postjuvenal moult. A specimen from Boruca, July 16, shows the moult beginning, while another from Carrillo, Oct. 12, still shows traces of the juvenal dress. The moult involves only the body plumage and wing-coverts." (W. E. C. Todd.)

Very abundant over the whole Caribbean slope and Pacific lowlands, although in smaller numbers in the latter region. It extends regularly up to 2,000 feet and stragglers are occasionally taken up as high as 3,000 feet. The bird is to be found wherever there are open fields, pastures, or natural grass belts, such as are along the larger streams. It seldom or never enters the forest. I found the birds breeding abundantly about Guápiles, where fresh eggs were first observed about May 16 and from that time on until July 16. The favorite nesting place in that locality seemed to be a large clump of grass in a pasture, the dome-shaped nest being placed in the centre of the clump, about two feet from the ground. The nests are built of grass blades and a few roots, lined with the same material, and average about seven inches in height by four and one-half in diameter at the bottom. The eggs are dull white, unmarked. Average measurements:  $24.5 \times 18.5$  mm.

740. **Arremonops superciliosus superciliosus** (Salvin).

*Embernagra superciliosa* SALVIN, Proc. Zool. Soc. Lond., 1864, 582 (Bebedéro, Gulf of Nicoya, W. Costa Rica; coll. Salvin and Godman).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 ("Nicoya [Enrique Arcé]").—FRANTZIUS, Jour. für Orn., 1869, 301 (Costa Rica).—NUTTING and RIDGWAY, Proc. U. S. Nat. Mus., V, 1882, 391 (La Palma, Nicoya).—ZELEDÓN, Cat. Aves de C. R., 1882, 9; An. Mus. Nac. de C. R., I, 1887, 112.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 412, *part* (Nicoya [Arcé, Frantzius]).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 761, *part* (C. R. [J. Carmiol], Bebedéro de Nicoya [Arcé]).—UNDERWOOD, Ibis, 1896, 436 (Miravalles, Bebedéro, Bagáces.)

[*Embernagra*] *superciliosa* SCLATER and SALVIN, Nom. Av. Neotr., 1873, 33. *Arremonops superciliosus superciliosus* RIDGWAY, Birds North and Mid. Amer., I, 1901, 449, 673 (western Costa Rica (Bebedéro and La Palma, Gulf of Nicoya)).—BANGS, Auk, XXIV, 1907, 310 (Barranca de Puntarenas [Underwood]).

U. S. Nat. Museum: Santo Domingo de San Mateo (Ridgway), Coyolár (Alfaro).

Bangs Collection: Bolsón, Coralillo, Miravalles (Underwood).

Carnegie Museum: Bebedéro, Miravalles, Esparta (Carriker). Eleven skins.

Found only in the northwestern portion of Costa Rica, from Santo

Domingo de San Mateo northward around the head of the Gulf of Nicoya, and thence covering the Nicoya peninsula and Guanacáste north to Nicaragua. I found it abundant at Esparta, Bebedéro, and on the lower slopes of the Volcan de Miravalles. A nest was taken at Esparta, June 5, 1907. The nest and eggs are very similar to those of *Arremonops conirostris richmondi*. The nest was placed on the ground on a hillside in the open woodland, and was dome-shaped, made of bamboo blades, weed-stalks, and roots, and lined with fine fibres. Its diameter outside was about five inches, inside two and one-half inches. The two eggs are dull white, unspotted, and measure:  $24 \times 16.5$  and  $24 \times 16$  mm.

#### 741. *Melozone leucotis* Cabanis.

*Melozone leucotis* CABANIS, Jour. für Orn., VIII, 1860, 413 (Costa Rica [Hoffmann and Frantzius], Berlin Mus.).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (San José, Angostura, Guaitíl [J. Carmiol], San Juan [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 302 (Guaitíl and Angostura).—RIDGWAY, Birds of North and Mid. Amer., I, 1901, 444 (highlands of Costa Rica: San José, Angostura, Guaitíl, San Juan, Cartago, etc.).

*Melozone leucote* CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 169 (Angostura [Carmiol]).

*Pyrgisoma leucote*, SCLATER, Cat. Am. Birds, 1862, 120 (Costa Rica).—SCLATER and SALVIN, Proc. Zool. Soc. Lond., 1868, 326, *part* (Costa Rica); Exotic Orn., 1868, 128, *part* (Costa Rica).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (San José and Cartago).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 403 (previous references cited).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Cartago, San José, Guaitíl).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 736 (Irazú district [Rogers]).

*Pyrgisoma leucotis* ZELEDÓN, Cat. Aves de C. R., 1882, 9.—CHERRIE, Auk, IX, 1892, 249 (San José, C. R., descr. of young).

U. S. Nat. Museum: Rio Maria Aguilar (Alfaro), Sarchí (Underwood), Alajuéla (Alfaro).

Bangs Collection: Carrillo, Escazú, San José, Irazú (Underwood).

C. H. Lankester Collection: Tres Rios.

Carnegie Museum: Escazú and San José (Underwood). Two skins.

Found sparingly over the central plateau. I did not happen to meet with this species in life, common as it is in certain places, but I understand it is found in shrubbery, second-growth scrub, and hedge-rows, not inhabiting the thick forest.

#### 742. *Melozone cabanisi* (Sclater and Salvin).

*Melozone biarcuata* (not *Pyrgita biarcuata* Prévost) CABANIS, Jour. für Orn., 1860, 412 (San José [Frantzius, Hoffmann and Ellendorf]); 1866, 233, *part* (Costa Rica).

- Pyrgisoma biarcuatum* (not of Bonaparte) SCLATER, Cat. Am. Birds, 1862, 120, part (C. R.).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (San José [Hoffmann]).—FRANTZIUS, Journ. für Orn., 1869, 301 (San José).
- Pyrgisoma kieneri* (not of Bonaparte) CASSIN, Proc. Ac. Nat. Sci. Phila., 1865, 169 (C. R. [J. Carmiol]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103, 145 (San José [J. Carmiol], Grecia [F. Carmiol]).—FRANTZIUS, Jour. für Orn., 1869, 302 (San José).
- Pyrgisoma cabanisi* SCLATER and SALVIN, Proc. Zool. Soc. London, 1868, 324, 326 (San José, coll. P. L. Sclater); Exotic Orn., 1868, 129, pl. 65, fig. 1.—SALVIN, Ibis, 1869, 314 (San José).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (San José and Cartago).—NUTTING, Proc. U. S. Nat. Mus., V, 1882, 499 (San José).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 403 (Irazú [Rogers]).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Alajuela, San José, Grecia, and Irazú).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 734 (San José [J. Carmiol ; Boucard], Irazú [Rogers]).—CHERRIE, Auk, IX, 1892, 248 (San José; habits, descr. nest and eggs and young).
- Pyrgisoma cabanisii* ZELEDÓN, Cat. Aves de C. R., 1882, 9.
- Melozona cabanisi* RIDGWAY, Birds North and Mid. Amer., I, 1901, 441 (highlands of Costa Rica : San José, Grecia, Volcan de Irazú, Cartago, Navarro, Alajuela, etc.).

U. S. Nat. Museum: San José (Cherrie) (Underwood), Alajuela (Alfaro).

Bangs Collection: San José (Underwood).

C. H. Lankester Collection: Cachí.

Carnegie Museum: Tierra Blanca (Carriker), San José (Underwood).  
Five skins.

Common in some portions of the plateau region, especially in the valleys surrounding San José and Cartago. It does not descend lower than 3,000 feet nor go higher than about 6,000 feet. Its habits are essentially the same as those of the preceding closely allied species.

#### 743. *Brachyspiza capensis peruviana* (Lesson).

- Pyrgita peruviana* LESSON, Rev. Zool., 1839, 45 (Lima, Peru).
- Brachyspiza capensis peruviana* RIDGWAY, Auk, XV, Oct., 1898, 321 (Peru to S. Mexico; crit.).—RIDGWAY, Birds North and Mid. Am., I, 1901, 347 (Mexico to Peru).
- Zonotrichia pileata* CABANIS, Jour. für Orn., 1860, 411 (Costa Rica [Hoffmann and Frantzius]).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 57 (San José, Cartago, Zarcero, and Volcan de Irazú; descr. of eggs).—SALVIN and GODMAN, Biol. Centr.-Am., I, 1884, 370 (Irazú [Rogers]).—ZELEDÓN, Cat. Aves de C. R., 1882, 9; An. Mus. Nac. de C. R., I, 1887, 111 (Alajuela, Santa Maria de Dota, Cartago, and San José).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 610 (Irazú [Rogers], San José [J. Carmiol]).
- "*Zonotrichia*" *pileata* RIDGWAY, Proc. U. S. Nat. Mus., V, 1883, 496, 500 (Volcan de Irazú and San José).

*Zonotrichia capensis costaricensis* ALLEN, Bull. Am. Mus. Nat. Hist., III, No. 2, Sept. 29, 1891, 375 (San José; Am. Mus. Nat. Hist.).

U. S. Nat. Museum: Volcan de Turrialba, San José, Guayábo (Ridgway and Zeledón), San Juan de Irazú (Ridgway and Alfaro), Coliblanco (Ridgway), El Copey, Las Vueltas, and Santa Maria de Dota (Basulto), Santa Maria (Zeledón), Cartago (Cooper), San José (Alfaro, Cherrie, Underwood), Sabanilla, El Zarcéro.

Bangs Collection: Irazú (Underwood).

Carnegie Museum: Irazú, La Hondura, Ujurrás de Térraba (Carriker). Eleven skins.

"Two of the birds taken in September at Ujurrás de Térraba are in juvenal plumage, while another is in the midst of the postnuptial moult, which involves the body plumage only." (W. E. C. Todd.)

Very common throughout the cultivated portions of the highlands, ranging from 2,500 feet up to timber-line, but most abundant from 3,500 feet upwards. I found it breeding in great abundance on the Volcan de Irazú at an elevation of 8,000 to 9,000 feet, the nests being placed on the ground, usually under the side of an old log lying in a field or pasture, or else in a clump of weeds or grass from one to three feet above the earth. No nest was found with more than two eggs. The nest is rather loosely built of fine dried grass-stems, lined with finer blades of grass and a little thistle-down. Outside measurements,  $80 \times 50$  mm.; inside,  $45 \times 30$  mm. The eggs are pale cerulean-blue, finely speckled and dotted with purplish-rufous in greater or less degree, some having only the larger end heavily marked, while others are thickly speckled over the entire surface, but always more heavily at the larger end. Measurements:  $19.5$  to  $22 \times 13.5$  to 16 mm.

#### 744. *Junco vulcani* (Boucard).

*Zonotrichia vulcani* BOUCARD, Proc. Zool. Soc. Lond., 1878, 57, pl. 4 (Volcan de Irazú, Costa Rica, altitude 10,000 feet [coll. A. Boucard]).—SALVIN and GODMAN, Biol. Centr.-Am., I, 1886, 371, pl. 26, fig. 2.—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 602.

*Junco vulcani* RIDGWAY, Proc. U. S. Nat. Mus., I, Dec. 10, 1878, 255 (summit of Irazú; crit.).—ZELEDÓN, Cat. Aves de C. R., 1882, 9; An. Mus. Nac. de C. R., I, 1887, 111 (Volcan de Irazú).—NUTTING, Proc. U. S. Nat. Mus., V, 1883, 495 (summit of Irazú; habits, etc.).—RIDGWAY, Birds of North and Mid. Am., I, 1901, 304 (Volcano of Irazú, Costa Rica, above timber-line [10,000 ft.])—CARRIKER, Ann. Carnegie Museum, IV, 1908, 302 (Volcano Turrialba).

U. S. Nat. Museum: Irazú (Ridgway, Alfaro and Zeledón), Las Vueltas de Dota (Basulto).

Bangs Collection: Irazú (Underwood).

C. H. Lankester Collection: Irazú and Volcan de Turrialba.

Carnegie Museum: Volcan de Irazú (Carriker). Eight skins.

The Irazú Junco, the most southern and most aberrant member of the genus, is the sole surviving form of the Boreal Life-zone in Costa Rica, inhabiting the cold bleak summits of the highest volcanic peaks. It was first discovered by Jose C. Zeledón on the summit of the Volcan de Irazú in 1873, but the specimens collected were lost in transit to the United States, together with some other rare birds collected by Señor Zeledón. It was later rediscovered by Boucard in the early spring of 1877, and described by him the following year. Up to 1907 it was supposed to exist only on the summit of Irazú, but during that year Mr. Lankester and myself took specimens on the Volcan de Turrialba, where it is very scarce, owing I suppose to the fact that that volcano was in quite active eruption twenty-five or thirty years ago, enough to have driven the birds from the summit, where they always stay. In May, 1908, about fifteen specimens were taken by Mr. Basulto on the summit of the highest peak of the Dota Mountains. It is also found on the Volcan de Chiriquí in northern Chiriquí, which is the southernmost record. The bird lives in the low scrubby bushes which clothe the portion of the crater above timber-line. I did not find the nest, although I spent considerable time searching for it on Irazú.

745. ***Aimophila botterii sartorii*** Ridgway.

[*Peucaea*] *æstivalis*, var. *botterii* (not *Zonotrichia botterii* Sclater) RIDGWAY, Am. Nat. VII, 1873, 616, in text, *part*.

*Aimophila botterii sartorii* RIDGWAY, Birds of North and Mid. Amer., I, 1901, 259 (northern Nicaragua [El Volcan] ?, southern limit).

C. H. Lankester Collection: Miravalles, one specimen.

Carnegie Museum: Miravalles, adult ♂ (Carriker).

"Dr. Chas. W. Richmond very kindly compared this specimen with material in the U. S. National Museum and reported that it was 'nearly related to *sartorii*, but differed as follows: nearly like the type of *sartorii* above, differing only (as far as I can see) in having the three innermost wing-coverts without rufous edgings; underparts grayer (much less buffy), chiefly on the throat, chest, sides of neck, and ear-coverts; size larger, and the bill less swollen (*i. e.*, not so wide) on the base of the upper mandible; your bird appears to be nearer the two birds mentioned by Mr. Ridgway from northern Nicaragua (Bull. 50, I, 260, note 2).' We have subsequently compared the bird with other specimens of *sartorii* from the state of Vera Cruz, Mexico, and find that it is very close to that form,



although the wing formula is that of *A. b. petenica* (Salvin), at present known only from the type. Measurements are as follows: wing, 61; tail, 60; exposed culmen, 13; tarsus, 19.5 mm. In the absence of additional specimens, and in view of the uncertainty of the status of this latter form, it is perhaps best to refer our specimen, at least provisionally, to *sartorii*." (W. E. C. Todd.)

To Mr. C. H. Lankester belongs the credit of first adding this species to the Costa Rican ornithology, he having taken the first specimen at Miravalles in May, 1906. The birds were secured on the grassy slopes about Miravalles, in the same localities as *Aimophila rufescens hypæthrus*.

746. *Aimophila rufescens hypæthrus* Bangs.

*Hæmophila rufescens* (not *Pipilo rufescens* Swainson) UNDERWOOD, Ibis, 1896, 436 (Miravalles, Costa Rica).

*Aimophila rufescens rufescens* RIDGWAY, Birds N. and Mid. Amer., I, 1901, Addenda, p. 673 (Costa Rica; authority record of Underwood, cited above).

*Aimophila rufescens hypæthrus* BANGS, Proc. Biol. Soc. Wash., XXII, 1909, 37 (type from Cerro de Santa Maria, Costa Rica, ♂, January 4, 1908, C. F. Underwood; coll. E. A. and O. Bangs).

Bangs Collection: Cerro de Santa Maria and Tenorio (Underwood).  
Eight skins.

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Miravalles (Carriker). Six skins.

This appears to be a well marked southern race of *Aimophila rufescens*, resembling true *rufescens* of northern Mexico, except that it is smaller, with the bill actually larger. It is not at all strange that this isolated colony of birds in northwestern Costa Rica should be distinct, when the wide gap separating them from their northern allies is considered. It was first reported by Underwood in 1896, from Miravalles, at which time he took several specimens which were identified by Salvin as *Hæmophila rufescens*. The bird was not taken again until 1906, when Mr. Lankester and myself took a small series, also at Miravalles. The next year Underwood again took specimens which Mr. Bangs discovered were different from any described form, and gave it the name used above.

Its range is confined to northwestern Costa Rica, north of the head of the Gulf of Nicoya, and on the Pacific foothills. It probably extends up into Nicaragua, although it has not been reported from that country. The birds are found in open country, where there are scattering bushes and scrubby trees.

747. *Aimophila ruficauda ruficauda* (Bonaparte).

*Hæmophila ruficauda* ZELEDÓN, Cat. Aves de C. R., 1882, 9.—SALVIN, Ibis, 1870, 114 (C. R. [J. Carmiol]).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 396, *part* (C. R. [Carmiol]).—UNDERWOOD, Ibis, 1896, 436 (Miravalles, Bebedéro, and Bagáces).

[*Hæmophila*] *ruficauda* SCLATER and SALVIN, Nom. Av. Neotr., 1873, 33, *part* (C. R.).

*Aimophila ruficauda* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112.

*Aimophila ruficauda ruficauda* RIDGWAY, Birds of North and Mid. Am., I, 1901, 238, *part* (Costa Rica, Pacific side); 673 (Miravalles).

U. S. Nat. Museum: Mojica (Alfaro and Cherrie), Bebedéro (Alfaro).

Acad. Nat. Sci. Philadelphia: Bagáces (Underwood).

Bangs Collection: Bolson, Coralillo, Tenorio, Bebedéro (Underwood).

Carnegie Museum: Bagáces (Carriker). Two skins.

"Both of the specimens collected are females in fresh plumage, one of them renewing the tail. They compare favorably with other specimens in coloration, but are considerably larger, their measurements being those of *A. r. lawrencii*." (W. E. C. Todd.)

Taken on the "sabanás" around Bagáces, where they were not at all common at that time. This species ranges over the whole of the lower part of the grass-lands of Guanacaste, but not going much above 1,000 feet, and being commoner in the lowlands bordering the Tempisque River. It does not get over the mainland proper.

747. *Coturniculus savannarum obscurus* (Nelson).

*Coturniculus passerinus* CABANIS, Jour. für Orn., 1860, 412 (C. R. [Frantzius]).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (see Cabanis, J. f. O., 1860).—FRANTZIUS, Jour. für Orn., 1869, 301 (San Isidro and Guadeloupe).—ZELEDÓN, Cat. Aves de C. R., 1882, 9.—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 384 (see Frantzius, J. f. O., 1869).—UNDERWOOD, Ibis, 1896, 436 (Miravalles).—RIDGWAY, Birds of North and Mid. Amer., I, 1901, 210 (Costa Rica in winter).

*Ammodramus savannarum obscurus* NELSON, Auk, XIV, Jan., 1897, 61 (Minatitlan, S. E. Vera Cruz, Mexico, U. S. Nat. Mus.).

Bangs Collection: Tenorio (Underwood). Seven skins.

C. H. Lankester Collection: Miravalles.

Carnegie Museum: Miravalles, May 25 to June 23, 1906 (Carriker). Ten skins.

"Upon comparison of these specimens with the type series of *C. s. obscurus*, they prove referable to that form rather than to *C. s. cracens* Bangs, from British Honduras, being merely a little larger. Judging from Messrs.

Salvin and Godman's remarks (Biologia) it is likely that their birds from Guatemala were also of this form, although the most recent record from that country (Dearborn, Field Mus. Nat. Hist., Orn. Series, I, 1907, 116) is given as *C. s. bimaculatus*—based however on March specimens, which may have been migrants. At any rate it seems probable that the range of the present form is practically continuous from southern Mexico to northwestern Costa Rica, and it should be looked for in suitable situations in the intervening region." (W. E. C. Todd.)

The specimens above referred to were taken on the grassy slopes of Miravalles and were unquestionably breeding and resident birds. They were fairly abundant, and very likely breeding at that time, the females being incubating, which would account for the small number of that sex taken. All Costa Rican records should be referred to this form and not to the northern bird as a migrant, which I do not believe reaches nearly so far south as Costa Rica. The species is almost wholly confined to the higher grass-lands of Guanacaste, rarely straggling up into the interior, as seen by the records of Frantzius (San Isidro and Guadeloupe).

749. **Emberizoides sphenurus lucaris** Bangs.

Native name "Chicharron."

*Emberizoides sphenura hypochondriacus* BANGS, Auk, XXIV, 1907, 309 (Boruca and Barránca de Térraba, May and June, 1906 [Underwood]).

*Emberizoides sphenura lucaris* BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 34 (type locality, Boruca [Underwood]).

Bangs Collection: Buenos Aires—also localities cited above (Underwood).  
Carnegie Museum: Buenos Aires and Paso Real (Carriker). Nineteen skins.

"Several specimens of the series of nineteen birds collected at Paso Real and Buenos Aires de Térraba show a touch of clay-color on the abdomen. Some variation also exists in the amount of streaking on the sides.

"This form is most nearly related to *E. s. hypochondriacus* Hellmayr, from Chiriquí, to which Mr. Bangs referred a series from the same general region where Mr. Carriker later obtained his birds. No form of this species has as yet been found between Chiriquí and the Santa Marta region of Colombia." (W. E. C. Todd.)

I took first four males near Paso Real on August 5, where it was very rare and hard to shoot. Later I found it abundant on the large "sabana" east of Buenos Aires. During the heat of the day the birds are scarcely

ever to be seen, but in the evening after a shower they seem to spring up everywhere, all singing vigorously. The song slightly resembles that of the Grasshopper Sparrow, but is much louder, clearer, and easier to locate, as the bird hangs on a swaying grass-stalk or sits on the top of a weed. The nest is placed on the ground at the foot of a small weed or tussock of grass. It is built of blades of grass, strengthened with a few roots and lined with grass. One nest observed at Paso Real contained two half-fledged young, but all the others seen were old and abandoned.

750. *Spiza americana* (Gmelin).

*Euspiza americana* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 104 (Tabacáles [Frantzius], San José, and Dota [J. Carmiol]).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 58 (San José and Volcan de Irazú, March).—ZELEDÓN, Cat. Aves de C. R., 1882, 9.

*Spiza americana* NUTTING, Proc. U. S. Nat. Mus., V, 1882, 391 (La Palma de Nicoya, May 1, abundant).—ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 111 (Cartago, Alajuela, Jiménez).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 773 (Angostura [J. Carmiol], Nicoya, March [E. Arcé]).—CHERRIE, Auk, VII, 1890, 334 (San José, Sept. 29); IX, 1892, 248 (San José, Sept. 27 to Apr. 20); Expl. Zool. en C. R., 1893, 29 (Lagarto de Térraba, Feb.).—SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 416 (Nicoya [Arcé]).—UNDERWOOD, Ibis, 1896, 437 (Miravalles).—RIDGWAY, Birds of North and Mid. Am., I, 1901, 173.—BANGS, Auk, 1907, 309 (El Pózo de Térraba, April 3 to 12 [Underwood]).

U. S. Nat. Museum: Bonilla, March, 1908 (Basulto).

Bangs Collection: Bolson, Dec. 13; Bebedéro, June (?); San José and Cartago, March (Underwood).

Carnegie Museum: Bebedéro, Apr. 27; El Hogar, March 25; Buenos Aires de Térraba, Sept. 4 (Carriker); San José, March 27 and Sept. 12; La Estrella, April (Underwood). Six skins.

"The Buenos Aires bird is a female in first winter plumage. All the spring birds have apparently completed the prenuptial moult." (W. E. C. Todd.)

An abundant winter visitor throughout almost the whole of Costa Rica wherever cultivated or grass-lands are to be found. They usually, arrive about the first week in September and some linger on till late in April before leaving. They prefer the plateau region to the lower and hotter coastal plains, where food is also less plentiful. During their entire stay in the south they always remain in flocks of from five or six up to as many as fifty at times. The rice-fields in the region west of San José (from Turrúcares to San Mateo) are favorite localities for them.

751. *Astragalinus columbianus* (Lafresnaye).

*Chrysomitris colombianus* LAFRESNAYE, Rev. Zool., 1843, 292 (Colombia, type in coll. Boston Soc. Nat. Hist.).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (San José [Frantzius]).—FRANTZIUS, Jour. für Orn., 1869, 302.—ZELEDÓN, Cat. Aves de C. R., 1882, 9.

*Astragalinus columbianus* CABANIS, Mus. Hein., I, 1851, 159; Jour. für Orn., 1861, 94.

*Spinus columbianus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112.

*Astragalinus psaltria columbianus* RIDGWAY, Birds North and Mid. Am., I, 1901, 120 (Costa Rica).

Carnegie Museum: Juan Viñas, March; La Estrella de Cartago, November (Carriker). Four skins.

"The Juan Viñas bird is a male apparently in the first prenuptial moult, the buffy feathers of the throat being replaced by pure yellow, and the olivaceous of the back by glossy black. The characteristic white of the base of the primaries is obvious, but there is no trace of white on the tail. The three specimens from Estrella de Cartago are females in first winter plumage, with skulls still soft. They differ conspicuously from examples of *Astragalinus psaltria hesperophilus* in the same stage of plumage, being much browner above, and more buffy and yellow below.

"Authors have differed as to the status of this form, owing to the occurrence in Costa Rica and Colombia of puzzling intermediates between it and *croceus*, together with perfectly typical examples of both. We have examined some of these specimens, in which one side of the tail is perfectly plain and the other shows a conspicuous white spot. We think that these facts argue strongly for the specific distinctness of the two birds, the so-called intermediates being really hybrids, as suggested by Sharpe (Cat. Birds Brit. Mus., XII, 1888, 208)." (W. E. C. Todd.)

The range of this species in Costa Rica, so far as is known, is just about the same as that of the following, occupying the mountains of the interior, and so far as I was able to observe having the same habits.

752. *Astragalinus psaltria croceus* (Jouy).

*Chrysomitris mexicana* LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (Barránca, San José [J. Carmiol], San José [Frantzius]).—SALVIN, Ibis, 1869, 314 (Costa Rica; crit.).—ZELEDÓN, Cat. Aves de C. R., 1882, 9.—SALVIN and GODMAN, Biol. Centr.-Am., I, 1886, 431 (C. R. [Frantzius, Hoffmann]).—SHARPE, Cat. Birds Brit. Mus., XII, 1888, 206, *part* (Volcan de Cartago [Arcé]).

*Astragalinus mexicanus* CABANIS, Jour. für Orn., 1861, 7 (C. R. [Frantzius, Hoffmann]).

*Spinus mexicanus* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (San José, Cartago, and Volcan de Irazú).—CHERRIE, Auk, IX, 1892, 249 (San José).

*Spinus psaltria croceus* JOUY, Proc. U. S. Nat. Mus., XVI, no. 975, Apr. 18, 1894, 780 (Panama; U. S. Nat. Mus.).

*Astragalinus psaltria croceus* RIDGWAY, Birds N. and Mid. Amer., I, 1901, 118 (Costa Rica).

Bangs Collection: Escazú and Azahár de Cartago (Underwood).

U. S. Nat. Museum: El Salitral, San José; Volcan de Irazú (Zeledón), San José (Cherrie), Cartago (Cooper).

This form also is found in the highlands, but its range is a little lower than that of the preceding species, as it occurs all the way from 3,000 up to 6,000 feet, but not much higher. I did not secure specimens of this bird and have never seen it alive, so know little or nothing concerning its habits or habitat, but presume that they are similar to those of the preceding species.

753. *Spinus xanthogaster bryanti* (Cassin).

*Chrysomitris xanthogastra* DU BUS, Bull. Roy. Ac. Belg., XXII, pt. I, 1855, 152 (type from near Ocaña, Colombia).—SCLATER and SALVIN, Proc. Zool. Soc.

Lond., 1870, 785, *part* (Costa Rica).—ZELEDÓN, Cat. Aves de C. R., 1882, 9.

*Chrysomitris xanthogaster* SCLATER and SALVIN, Nom. Av. Neotr., 1873, 34, *part* (Costa Rica).

*Chrysomitris xanthogaster* SALVIN and GODMAN, Biol. Centr.-Am., Aves, I, 1886, 430, *part*, pl. 31, fig. 3 (Frailes [Carmioli], Irazú [Rogers]).—SHARPE, Cat. Birds Brit. Mus., XII, 1888 (Irazú [Rogers], Dota, and Frailes [J. Carmioli]).

*Spinus xanthogastra* ZELEDÓN, An. Mus. Nac. de C. R., I, 1887, 112 (Cartago, Dota, and Sarchí).

*Chrysomitris bryanti* CASSIN, Proc. Acad. Nat. Sci. Phila., 1865, 21 (type from Dota [J. Carmioli]; in coll. U. S. Nat. Mus.).—LAWRENCE, Ann. Lyc. N. Y., IX, 1868, 103 (Costa Rica [Van Patten]).—FRANTZIUS, Jour. für Orn., 1869, 302 (Costa Rica).—BOUCARD, Proc. Zool. Soc. Lond., 1878, 56 (Volcan de Irazú).—CABANIS, Jour. für Orn., 1861, 94 (Costa Rica [Frantzius]).—RIDGWAY, Birds of N. and Mid. Amer., I, 1901, 105 (Costa Rica).

*Spinus xanthogaster bryanti* BANGS, Proc. N. Eng. Zool. Club, IV, 1908, 34 (Costa Rica [Underwood]).

Bangs Collection: Volcan de Irazú, Azahár de Cartago, Carrillo, La Estrella de Cartago (Underwood).

(Underwood *in litt.*): Sarchí, Cartago, Turrialba, Dota Mountains.

Carnegie Museum: Volcan de Irazú (Underwood), Ujurrás de Térraba (Carriker). Four skins.

This finch is confined to the highlands and mountains, ranging from 2,000 feet up to 8,000 and 9,000 feet on the high volcanoes. It is most abundant between 6,000 and 8,000 feet. It is usually found in small flocks, but is very shy and hard to shoot, flying away at the first

alarm. The call is very similar to that of the common American Goldfinch.

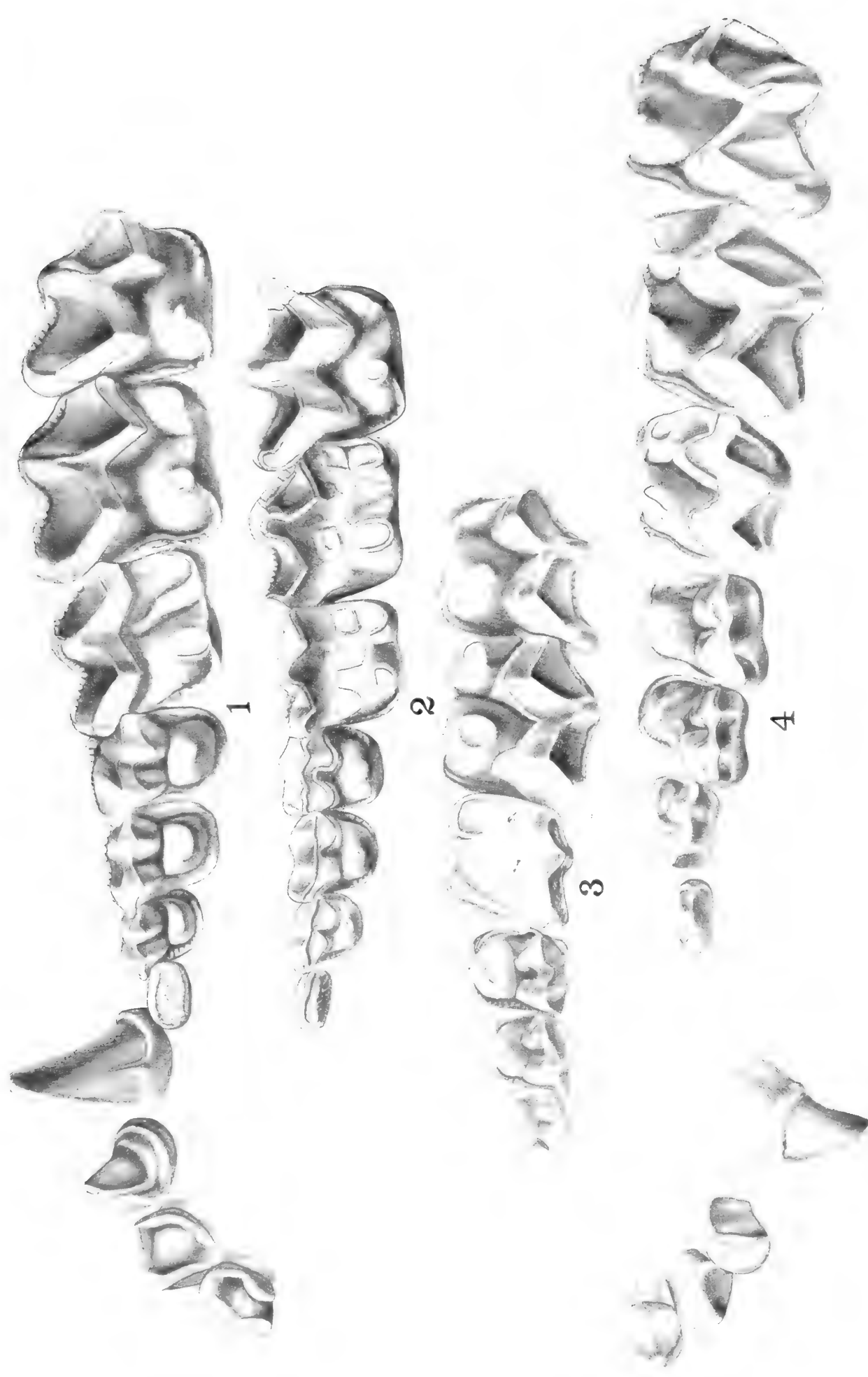
"One of the September birds is a male just completing the postjuvenile moult, and still showing greenish feathers on the throat, head, and back.

"Cassin, in describing his *Chrysomitris bryanti* in 1865, was evidently unaware of the publication of *Chrysomitris xanthogaster* by Du Bus ten years earlier, and the former name has usually been relegated to synonymy. Recently, however, Mr. Bangs has pointed out that subspecific differences exist between the birds of Colombia and Costa Rica, contrary to Messrs. Salvin and Godman's opinion, and has proposed to revive the name *bryanti* for the Costa Rican bird. Having examined the material upon which Mr. Bangs' study was based, we are of the opinion that the separation was perfectly justifiable, the differences being obvious at a glance. Indeed, considering the fact that the comparatively low intervening country in Panama seems to constitute an apparent gap in the range of this alticoline species (indicated by the entire absence of records), it is not strange that the virtual isolation of the northern birds has evolved differential characters." (W. E. C. Todd.)

*Note.*—Acknowledgments are due to Mr. W. E. C. Todd for assistance in revising the proof of this paper, especially as regards the orthography of the scientific names. In certain instances, however, the Editor has seen fit to alter the latter, in accordance with the rulings of the International Commission on Zoölogical Nomenclature.—W. J. HOLLAND.







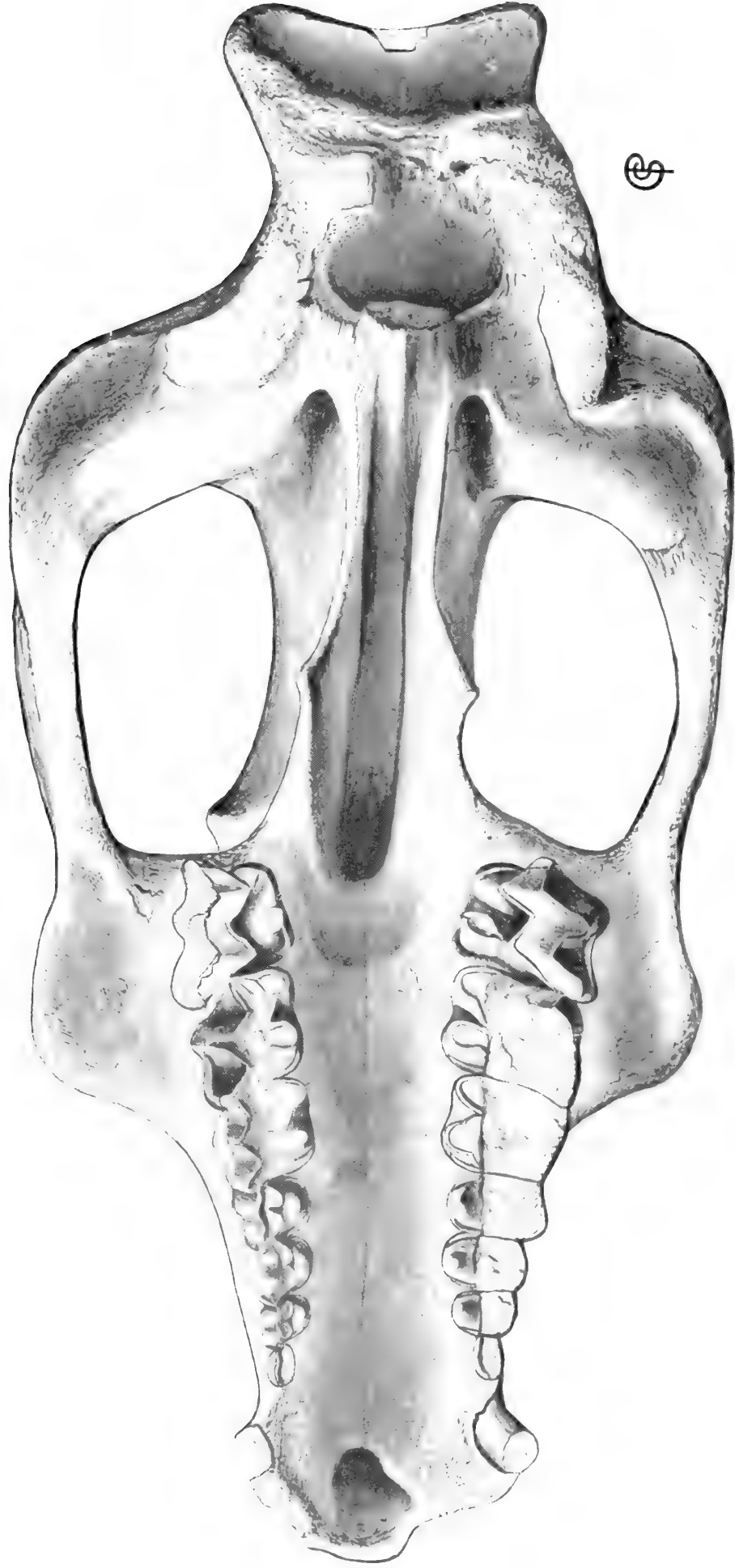
Dentition of *Telmatherium*, *Dolichorhinus*, and *Manteoceras*.





*Dolichorhinus longiceps* Douglass. C. M. Cat. Vert. Foss. No. 2347.  
(Somewhat less than one-third natural size.)

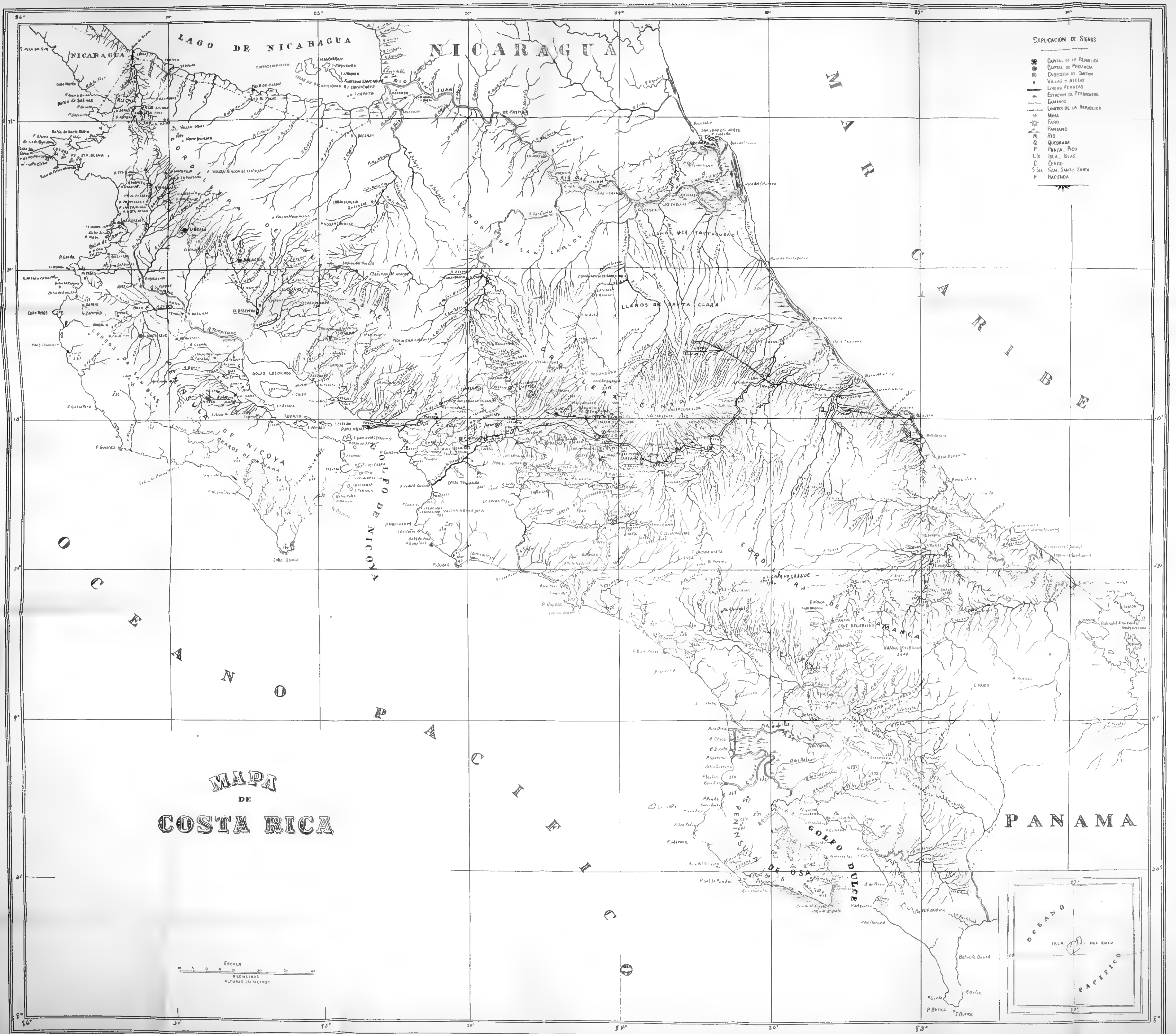




*Dolichorhinus longiceps* Douglass. C. M. Cat. Vert. Foss. No. 2347.

(Somewhat less than one-third natural size.)





EXPLICACION DE SIGNOS

- CAPITAL DE LA REPUBLICA
- CAPITAL DE PROVINCIA
- CABECERA DE CANTON
- VILLAS Y ALDEAS
- LINEAS FERREAS
- ESTACIONES DE FERROCARRIL
- CAMINOS
- LIMITE DE LA REPUBLICA
- MINA
- FANTO
- PANTANO
- RIO
- QUEBRADA
- PUNTA, PICO
- ISLA, ISLAS
- CERRO
- SAN, SANTA
- HACIENDA

MAPA  
DE  
COSTA RICA

ESCALA  
NÚMERO DE METROS  
ALTURAS EN METROS







# ANNALS

OF THE

# CARNEGIE MUSEUM

VOLUME VI. NO. 4.

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## EDITORIAL NOTES.

THE present number of the Annals contains the Title-page, the Table of Contents, the Lists of Plates and Figures in the Text, together with the Index of Volume VI. Owing to the great length of the article on the Birds of Costa Rica published in Part 3, it has seemed inadvisable to attempt to include in this volume any other contributions than those therein contained.

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THE fourteenth celebration of Founder's Day was observed at the Institute with appropriate ceremonies. The principal addresses were made by President Taft and by the Belgian Minister, Count Conrad de Buisseret. In anticipation of the event a number of groups in the Section of Recent Vertebrates were placed upon exhibition and the Gallery of Useful Arts was on that day thrown open to the public for the first time.

---

MR. JOHN D. HASEMAN, after two and a half years' absence in South America, has safely returned to the Museum. The collections of fishes which he has made on the southern continent are among the largest and most important which have ever come from South America, and although the work of classifying and arranging them has just been taken in hand, it is evident that Mr. Haseman has succeeded in acquiring for the Museum specimens of the majority of the species which have hitherto been listed from South America and undoubtedly a number of species which are new to science. Mr. Haseman's collections, together with those taken by

Dr. C. H. Eigenmann in British Guiana, constitute the nucleus of a very large and important collection representing the ichthyology of Brazil and adjacent countries.

---

THE Director of the Museum has just returned from Utah, where he had an opportunity to examine the work which is being done by Mr. Earl Douglass in Uinta County. Mr. Douglass has opened a quarry at the summit of one of the peaks lying west of the Green River, south of the point where it breaks through Split Mountain on its passage from Wyoming into Utah. Thus far this quarry has yielded the remains of seven separate dinosaurs, three of which are evidently carnivorous dinosaurs remarkably well preserved. The other four are sauropod dinosaurs, one of them apparently a Brontosaurus of large size, the bones of which are remarkably well preserved and apparently have suffered hardly any dislocation. Mr. Douglass has succeeded thus far in recovering between forty and fifty caudal vertebræ lying in a complete series from their union with the sacrum onward toward the extremity of the tail. The pelvic girdle is in position and near by is the femur. A large number of ribs and dorsal vertebræ have already been uncovered. One of the most interesting discoveries is a series of colossal cervical vertebræ which measure about four feet from the top of the spines to the base of the cervical ribs. They apparently have sustained no crushing. Whether as the work progresses it will be found that these remarkable cervicals pertain to the large skeleton already alluded to, or represent portions of a still larger sauropod dinosaur, cannot as yet be positively stated. The work which is being done in extricating these remains is one of great difficulty and attended with considerable expense, as the material in which the bones are imbedded is hard sandstone.

Familiar as the writer is from personal knowledge with all the principal quarries which have been opened in the United States in the past and from which dinosaurian remains have been taken, he does not hesitate to say that the present quarry, so far as it has been developed, is apparently richer and the specimens better preserved than in any similar opening which has been made. It may best be compared with the famous quarry of Professor Marsh at Cañon City, which was subsequently operated by the Carnegie Museum, and from which Mr. Hatcher took a quantity of valuable material; but the specimens are better preserved and have experienced far less dislocation than in that famous deposit. The bones in the quarry opened by Mr. Douglass have apparently not been

crushed in the least, although the strata in which they were originally deposited are now tilted up at an angle of sixty degrees with the horizon.

---

THE Museum has acquired from Dr. J. J. Stevenson of New York the greater part of his collection of works on geology and paleontology. The collection is important because it fills a number of lacunæ which heretofore had existed in our collection. It is especially rich in the reports of the various geological surveys carried on by the general Government and by the various states.

---

THE Director of the Museum, accompanied by Mr. A. S. Coggeshall, sailed from New York on June the 4th for Cherbourg. His purpose is to proceed as quickly as possible to St. Petersburg, where he has promised to be on June 15, in order there to set up the replica of *Diplodocus carnegiei* which has been kindly presented by Mr. Andrew Carnegie to His Majesty the Czar. It will be installed among the geological collections of the Imperial Academy of Sciences, known as the Museum of Peter the Great.

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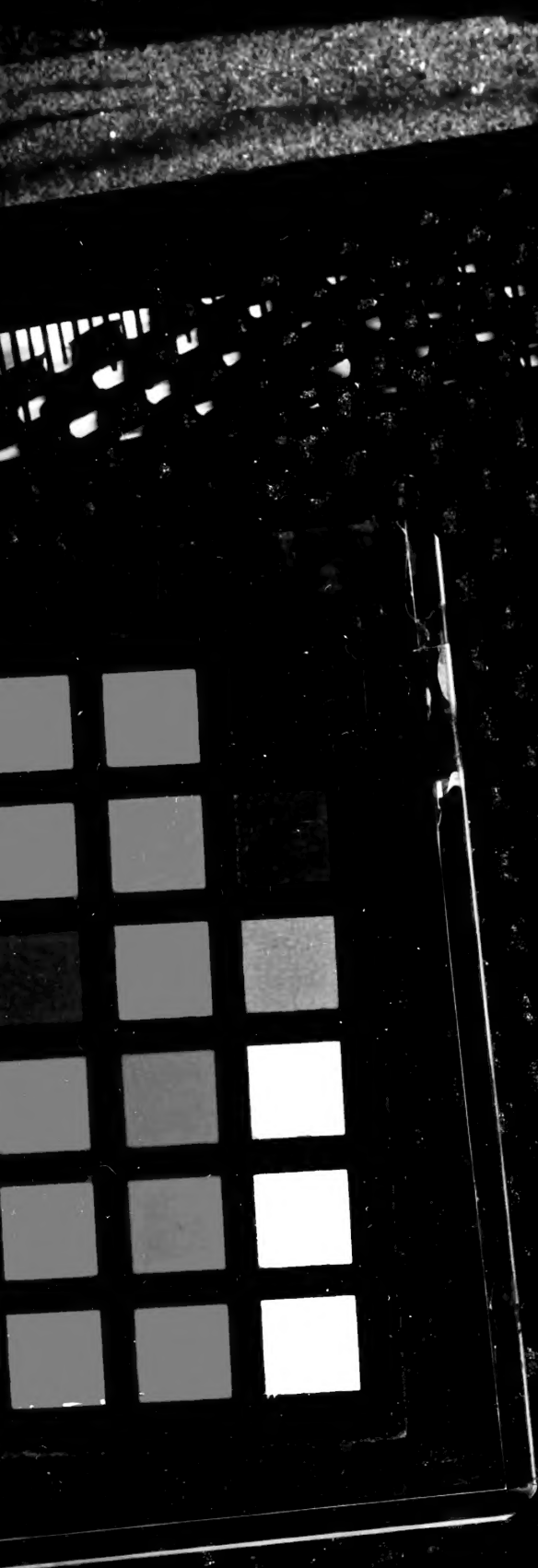




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